

modern machine shop

**HOW TO
HEAT TREAT
PROFITABLY**

See Page 108

**PRECISION
MACHINING OF
COMPLEX PARTS**

See Page 116

NOVEMBER 1958



World's Standard of
HARDNESS
TESTING
ACCURACY

WILSON MECHANICAL INSTRUMENT DIVISION

American Chain & Cable Company, Inc.
230-G Park Ave., New York 17, N.Y.

ADAMAS 548 CHALLENGES YOUR PRESENT STEEL CUTTING GRADE!

A unique balance of key metallurgical properties . . . this is the difference between Adamas 548 and other steel cutting carbide grades. Let 548's metallurgical superiority prove itself on your next steel cutting job. Take your first step toward optimum carbide performance today . . .

(Specific Grade 548 physicals relating to hardness, density, and transverse rupture strength plus microphoto of grain structure available upon request.)

SELECT

a throwaway style and size from the form below. Complete the form and request your Purchasing Department to mail it to Adamas. No invoice will be sent to you for 30 days. During this 30 day period . . .

TEST
JUDGE

the package of ten Grade 548 inserts you receive against your present steel cutting grade.

for yourself the performance of your 548 inserts. If for any reason you feel 548 did not outperform your present steel cutting grade, simply return all used and unused inserts and your order will be automatically cancelled . . . at no charge to you!

SEND FOR YOUR 548 PACKAGE TODAY!

→ CUT OUT AND MAIL ←

ADAMAS CARBIDE CORPORATION DEPT. 471, KENILWORTH, NEW JERSEY

Please enter my order for 10 pieces (one package) of Grade 548 inserts . . . style and size as checked. If at the end of 30 days, for any reason I am not satisfied with their performance I will return all used and unused inserts and my order will be automatically cancelled . . . at no charge.

TRIANGULAR
PRECISION-GROUND
NEGATIVE RAKE



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ORDER NO.

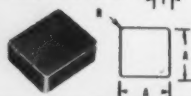
I.C. A. T R

PRICE

CHECK
ONE

TB-12P22	3/8	1/8	1/32	AS PER CURRENT ADAMAS CATALOG	<input type="checkbox"/>
TB-12P32	3/8	3/16	1/32		<input type="checkbox"/>
TB-12P33	3/8	3/16	3/64		<input type="checkbox"/>
TB-16P32	1/2	3/16	1/32		<input type="checkbox"/>
TB-16P33	1/2	3/16	3/64		<input type="checkbox"/>

SQUARE
PRECISION-GROUND
NEGATIVE RAKE



SQ-16P22	1/2	1/8	1/32	AS PER CURRENT ADAMAS CATALOG	<input type="checkbox"/>
SQ-16P32	1/2	3/16	1/32		<input type="checkbox"/>
SQ-16P33	1/2	3/16	3/64		<input type="checkbox"/>
SQ-24P32	3/4	3/16	1/32		<input type="checkbox"/>
SQ-24P33	3/4	3/16	3/64		<input type="checkbox"/>
SQ-24P34	3/4	3/16	1/16	<input type="checkbox"/>	

I would like a style (or size) other than listed above.
Please send me: _____

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ STATE _____



**GRADE 548 is specifically
recommended for machining**

**LIGHT TO MEDIUM CUTS
LIGHT INTERRUPTED CUTS**

Tough Alloy Steels:

3000	300 Stainless
4000	400 Stainless
5000	Tool Steels
6000	Monel
52100	Inconel
8600	Nitraloy



ADAMAS
CARBIDE CORPORATION
KENILWORTH, N.J.

Producers of Tungsten
Carbide Tools, Tool
Dies, Wear Parts

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HOWARD

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Member



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features in

Assembling & Finishing...Inspecting, Testing & Control
Press Working...Management & Safe Practices...Material
& Processes...Production Machining...Tooling & Design

PRACTICAL POINTERS FOR PROFITABLE HEAT TREATING

By A. S. Eves

The first installment of a series of articles on heat treating procedures to be published in successive issues of this magazine, the present discussion provides helpful tips for economically case hardening steel. After reading, be sure to clip and save this installment for future reference.

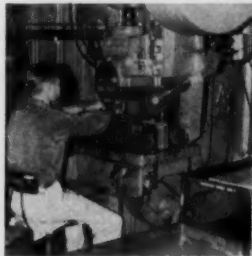
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THE MACHINE SHOP IN ELECTRONIC PARTS PRODUCTION

By R. E. Salrin

The vital importance of a precision machine shop in turning out electronic components is stressed. The discussion revolves around the precision machine shop at Learcal Division of Lear Incorporated, Santa Monica, California, since this shop is considered representative of the machine shop facilities required in most complex electronic parts production operations.

Page 116



X-RAY AND GAMMA-RAY UNITS PRODUCE PERMANENT RECORDS

American Chain and Cable Company's ACCO Steel Casting and R-P&C Valve Division announce new units for non-destructive testing purposes that will enable them to inspect high pressure valves and castings eight times faster than previously.

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in this issue

Control
.. Motor
& Des

NOVEMBER 1958 • VOL. 31 • NO. 6

WALKER MACHINERY HOLDS MACHINE TOOL EXHIBIT

This is the story of one man's answer to the recession. It is neither unique nor startlingly different. Rather, it is typical of what American businessmen are doing while the government planners are still trying to figure out what to do.

Page 126

NEW TOOL PROVIDES FASTER, BETTER CUTTING

The toolmaker's answers to the problem of cutting the tougher materials that are coming into increasing use have received another dimension with the recent development of an unusual method whereby it is possible to "hob grind" an end milling cutter in order to provide for faster as well as more efficient cutting.

Page 130

HOW TO DETERMINE WHICH TYPE OF NUMERICAL CONTROL SYSTEM IS BEST FOR YOU

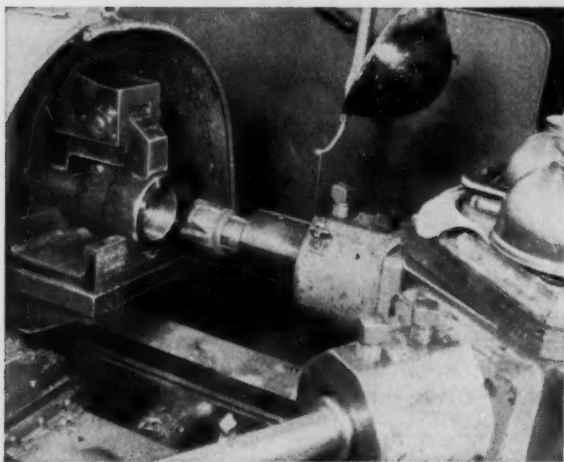
By Gilbert C. Close

With nearly 20 major companies now operating successful numerical control systems on a maintained production basis, those who have been engaged in the development of numerical control since it was conceived as a possible new production system can now stop theorizing and convert opinions to established facts, so says the author of this timely "how-to" presentation.

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modern machine shop



TWO

LANDIS Solid Adjustable Taps interchanged to thread valve body

Both taps are used at the same turret station (since others are required for additional tooling) —each shank has an open keyway for securing the tap in turret position to facilitate interchange.

In the first operation (illustrated —at the Fisher Governor Company in Marshalltown, Iowa), a 2½" LSA Tap produces 2½" 8-pitch UN threads of excellent quality 1½" long at 23 SFM. In

the interchange, a 1¾" LSA Tap produces a 1¾" 12-pitch UN thread ¾" long on the same workpiece. Both threads are cut to Class 2B fit on the WCB 1020 steel bodies with approximately 150 pieces completed before re-grinding the chasers.

LANDIS Solid Adjustable Taps, low in initial cost, are available in 15 sizes to tap diameters from 1⅛" to 9". For more information, please ask for Bulletin G-92.

482

LANDIS Machine COMPANY

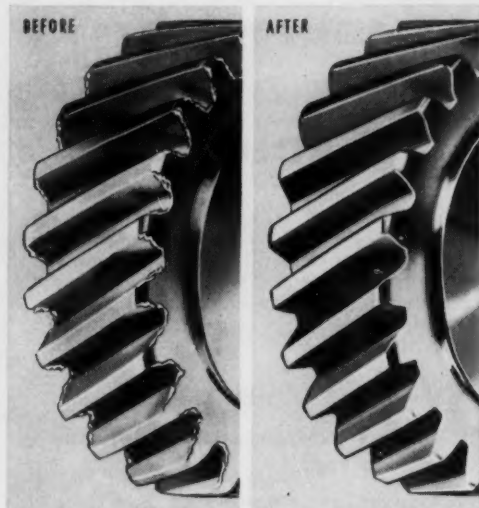
WAYNESBORO · PENNSYLVANIA · U. S. A.

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November, 1958

GEAR DEBURRING by *Hammond*



NEW ACCURACY and **SPEED** at Low Cost!

Here's the practical answer to the problem of deburring gears faster, more accurately, and at low initial investment. The MORRISFLEX machine will do definitely superior work to that done by hand, and at lower cost. Semi-automatic. Quick set-ups. Simple, economical, and reliable.

AUTOMATE YOUR GEAR DEBURRING/RADIUSING

No variation in any of the essentials of a deburring/radiusing job. Pressure, rotation, and radius are always constant, assuring uniform superior finish.

DOES NOT REQUIRE SKILLED OPERATORS

After simple initial setting, the MORRISFLEX operates independently of operator's skill. A wide variety of gears, splines, serrations, etc., can be handled. Light pressings can be deburred quickly in bulk quantities. A micro-finish, true radius can be obtained on hardened and face ground gears.



YOU GET A BETTER JOB WITH MORRISFLEX SEMI-AUTOMATIC DEBURRING MACHINE AND A POLISHING LATHE



SEND SAMPLES

Plain spur, helical, internal spline, bevel, worm, etc.
One finished and several rough.
Recommendations will be sent without obligation.

Hammond Machinery Builders
INC.

1615 DOUGLAS AVE.

KALAMAZOO, MICHIGAN

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Users Say: "Improvements Result in Even More Profitable Production!"

"BUFFALO" NO. 15 DRILLING MACHINES



For more than 25 years the "Buffalo" No. 15 Drill has been famous for *value* in terms of *production efficiency*. Today, more and more users are reporting that the many new features of these rugged, reliable machines add up to even greater productive value in their shops.

A few of the No. 15 Drill improvements:

- Correct belt tension automatically maintained.
- Convenient step-to-step belt changing on pulleys.
- Time-saving front-mounted start-stop switch.
- Easy-to-read speed range table.

Bench, floor and pedestal models are available in the new line of "Buffalo" No. 15 drills. Bench and pedestal types in one to six-spindle models. Tapping, mortising, routing and spot-facing attachments may be ordered.

Your "Buffalo" machine tool dealer will be glad to demonstrate the many advantages of the new No. 15 drill. Call him today, or write direct for bulletin 4024.



BUFFALO FORGE COMPANY

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Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING BENDING

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CLEVELANDS

automatically set the pace for progress!

Whitin Machine Works, Whitinsville, Mass., builders of textile preparatory machinery and other products, in part of a \$4½ million expansion program, has created one of the outstanding screw machine departments in the East. Sixteen new Cleveland Single Spindle Automatics (14, Model AB 3" Dialmatics and 2, Cleveland 4¼" Model AW's) are among the facilities that are automatically setting the pace for progress at Whitin Machine Works.

William Steele, Divisional Superintendent, and Eino Johnson, Department Foreman, de-

scribe this ultra-modern installation as "one that few companies anywhere can equal. Our machine tool investment includes highly versatile Cleveland Automatics, many with electronic controls, that make possible higher production with still closer tolerances . . . in many instances to 0.0005". As has been wisely said, 'you cannot build today's products with yesterday's machines, and still be in business tomorrow'."

Let Cleveland's automatically set the pace for progress in your plant. Call in a Cleveland Automatic sales engineer.

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4940 Beech Street
Cincinnati 12, Ohio
SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • S. ORANGE

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

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November, 1958

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NEW!



PORT CONTOUR CUTTERS

A.N.D. 10050

Eclipse

PORT CONTOUR CUTTERS
WITH
PRECISION GROUND FORMED RELIEF
INSURE

- LONGER LIFE • FINER FINISHES
- and • ARE EASILY RESHARPENED

H.S.S. AVAILABLE FROM STOCK

Other types of form ground port contour cutters are made by Eclipse in both H.S.S. and T.C.T. for special machining operations.

WRITE FOR PORT CONTOUR FOLDER



ECLIPSE COUNTERBORE COMPANY

1600 BONNER AVE., DETROIT 20, MICHIGAN

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November, 1958

VR Multiple tooling



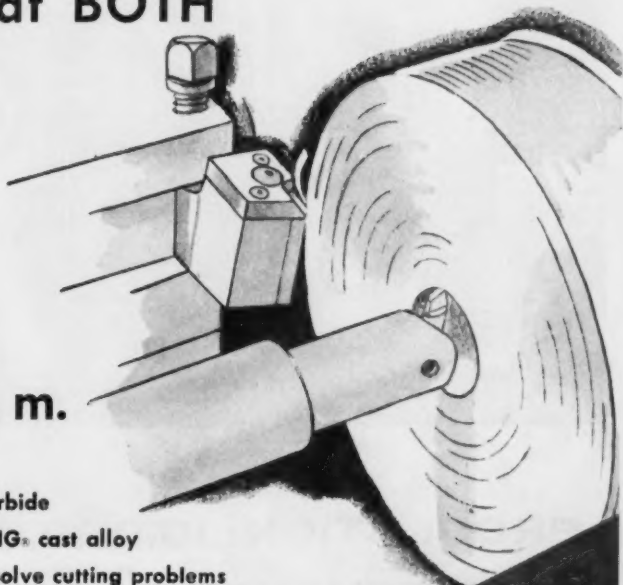
cuts at BOTH

450

and

113

s. f. p. m.



**How V-R Carbide
and TANTUNG® cast alloy
gang up to solve cutting problems**

PROBLEM: How to bore 2" I.D. at 113 SFPM while turning 8" O.D. at 450 SFPM.

SOLUTION: A V-R toolholder and throw away insert will perform perfectly on the 450 SFPM O.D. but the 113 SFPM boring speed demands the cutting qualities of V-R TANTUNG cast alloy. TANTUNG is especially engineered for speeds between carbide and High Speed Steel.

V-R Carbide and TANTUNG make a perfect tooling team to solve this and many other cutting problems. Ask your V-R Representative or write for complete information. V-R Engineers will be glad to work with you on all of your cutting problems.



Vascoloy-Ramet corporation

PRIME MANUFACTURERS OF REFRACTORY METALS ENGINEERED FOR THE JOB

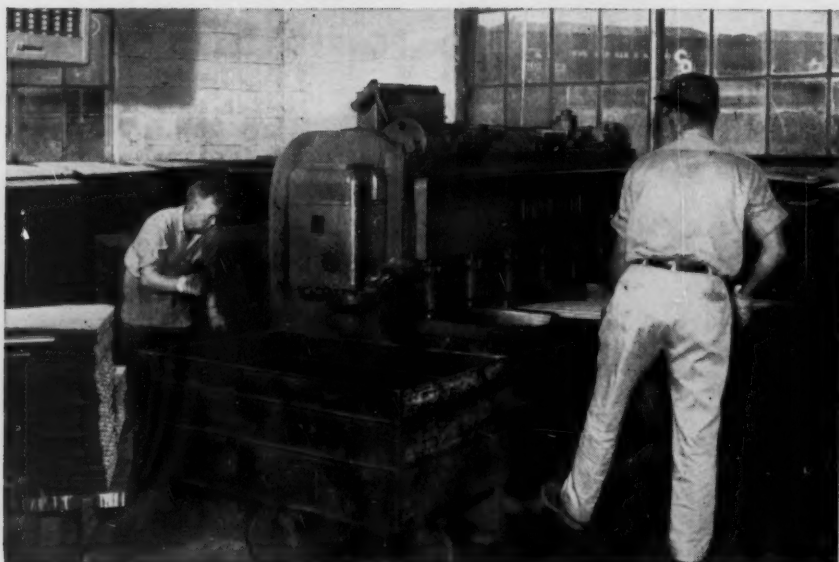
CT-7025

848 Market Street • Waukegan, Illinois

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PRODUCTION: 10,000,000 cuts MAINTENANCE COST: \$896⁰⁰

This Cincinnati® Shear has been in constant service for ten years, cutting 18-gauge corrugated sheet, 1010 draw quality, for a prominent heating equipment manufacturer at an average rate of 4000 cuts a day. That adds up to more than a million strokes per year—or 10,000,000 strokes in ten years.

Accuracy has always been excellent. The machine has been "down" only for blade changes. Special blades are used in this operation, to eliminate distortion of the corrugations.

Cost of machine maintenance, including blade resharpener, has been \$896.00 for the entire ten years. "This," says their production manager, "to my way of thinking, is very good performance." We agree. Yet this is not exceptional. Every Cincinnati® Shear is built to provide this kind of dependability and low maintenance, and we have hundreds of case histories to prove the point.

Specify Cincinnati® for all your shear requirements. Write Department G for Catalog S-7R.

Shapers / Shears / Press Brakes

THE **CINCINNATI**

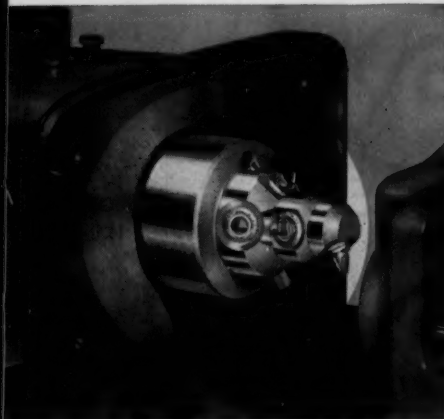
SHAPER CO.

Cincinnati 11, Ohio, U.S.A.

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now, pre-set tools
to accurate
part dimensions
outside the machine
with this new
Microbore® System



**Eliminate trial cuts...change tools
in seconds...simplify tool maintenance**

Using a standard setting block and indicator, Microbore tools can now be pre-set to accurate part dimensions outside the machine and quickly locked in the boring bar or tool holder without further adjustment.

"Pre-Set" eliminates scrap parts due to trial and error set-up and greatly reduces down time for worn tool point adjustment. "Pre-Set" encourages the operator to keep sharp tools in the machine assuring greater accuracies and produces the maximum number of pieces per tool grind by minimizing breakage due to dull tools.

"Pre-Set" also makes it possible to replace worn tools without changing the entire boring bar or tool holder—eliminates the need for stand-by bars—simplifies tool grinding and maintenance.

Microbore System of "Pre-Set" tooling may be applied to boring, turning, facing and chamfering operations and is especially suited to production and automated operations where machines must maintain peak production on long runs. Write for complete information.

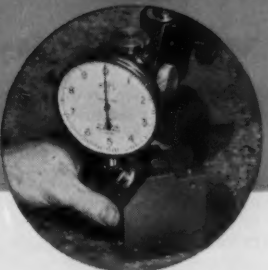
**SIMPLE
4-STEP
PROCEDURE**



1. To set up pilot tool, insert Microbore "Pre-Set" unit in boring bar. Adjust to part dimension by trial cut and final setting using Micrometer Vernier adjustment.



2. Remove adjusted pilot tool from the boring bar and install in the standard Microbore setting block.



3. Position indicator arm on high point of pilot tool in setting block and adjust indicator to zero.



4. Adjust gage pin to same zero setting. Any number of additional tools may now be pre-set and interchanged with pilot for precision boring the same diameter.

If necessary to pre-set for depth of bore, tumble block to adjacent side and repeat procedure.

The DeVlieg Microbore System of Adjustable Precision Tooling includes Standard Microbore Boring Bars and Boring Bar Sets, Special Cluster Tooling, Flash-Change Tooling and Tool Holders, Flash-Change Replacement Bridgeport Spindles, Turret Lathe Turning Heads and Adjustable Boring Heads.

DEVLIEG MICROBORE® SYSTEM

DEVLIEG MICROBORE • DIVISION OF DEVLIEG MACHINE COMPANY

Fair Street, Royal Oak, Michigan

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Missing Something ?



The Answer is Pink !



Switch to ^{Pink} CIMCOOL

Yes, if you're missing that extra something, try CIMCOOL[®] for metal cutting jobs. Here's why CIMCOOL has become the largest selling chemical cutting fluid in the world:

CIMCOOL LOWERS COSTS because it's longer lasting in machines . . . reduces downtime and costs for cleaning and changing.

CIMCOOL PERMITS FASTER SPEEDS and feeds, because of its chemical lubricity. It combines friction reduction and cooling capacity in a degree never before attained.

CIMCOOL IS CLEANER TO USE. Doesn't soil hands or clothing, contains no skin irritants, and is safer because it leaves no slippery film. It can't smoke, can't burn, and virtually eliminates rancidity and foul odors. So don't keep things *under* your hat . . . call your CIMCOOL Distributor today. He'll be

glad to give you full information on all the advantages of the entire family of CIMCOOL Cutting Fluids. YOU may be missing something! Or write, wire, or telephone, Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

CIMCOOL CUTTING FLUIDS

CIMCOOL S2 Concentrate—The famous pink fluid which still covers 85% of all metal cutting jobs. Effective, economical and clean.

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CIMCOOL Tapping Compound — Permits the use of highest tapping speeds and increases tap life amazingly.

Also, CIMCOOL Bactericide and CIMCOOL Machine Cleaner.



for 100% of all metal cutting jobs. The Answer is Pink!

Production-proved products of The Cincinnati Milling Machine Co.

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November, 1958

Circle 314 on Postpaid Card
For more data on advertisement on opposite page, →

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ROCKFORD MACHINE TOOL CO. 2500 KISHWAUKEE STREET ROCKFORD, ILLINOIS

**DON'T SPEND BIG MONEY
TO DO BIG JOBS!**

Put them on a Rockford Hy-Draulic Openside Shaper 36" 48" 60" 72"



HY-DRAULIC



HOW TO SAVE MONEY AND TIME ON SPINDLE REPAIRS

Make **POPE** Your Spindle Repair Department

POPE Repair and Rebuilding Service applies to any size, any make of anti-friction bearing Spindles — belt driven, motorized or high cycle.

POPE puts your Spindles in shape *quickly*, at lowest cost. You okay the cost figures before the work is done.

POPE repair work is done by the same expert craftsmen that build Pope Precision Spindles, and in the same air cleaned, air conditioned assembly department. The job will be done *right* the first time — *right* bearings, *right* preload, *right* lubrication, *right* assembly, *right* balance.

GET THIS! →

Bulletin R-2 tells you *how* and *why* Pope Precision spindle repair and rebuilding service save you money and time. Clip the coupon and get a copy by return mail.

POPE MACHINERY CORPORATION
261 River St., Haverhill, Massachusetts
Please mail copy of Bulletin R-2 to:

Name
Company
Address
City Zone State



No. 124

POPE

**ENGINEERS AND BUILDS STANDARD AND SPECIAL
PRECISION ANTI-FRICTION BEARING SPINDLES
FOR EVERY PURPOSE**

POPE MACHINERY CORPORATION • 261 RIVER STREET • HAVERHILL, MASS.

Established 1920

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*If you use reamers as much as
screw machines use bar stock...*



*This brand cuts down your reamer
usage, production time and costs!*



*The more you use reamers — high speed steel or carbide —
the more you need Union*

Union reamers, high speed steel or carbide, are all alike in one feature. Their consistent top quality reduces your production costs and improves your production quality. Union also manufactures drills, milling cutters, gear cutters, end mills, hobs and inserted blade cutters. **Available nationally through Union Distributors** and stocked in Union warehouses in Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York City and San Francisco.



UNION

TWIST DRILL COMPANY, Athol, Massachusetts

S. W. CARD DIVISION, Mansfield, Mass.; BUTTERFIELD DIVISION, Derby Line, Vt.

See Your UNION DISTRIBUTOR for cutting tools that will save you time and money
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**FELLOWS
MADE THE FIRST
GEAR SHAPER
CUTTER**

... and



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PRECISE
LI

. and FELLOWS

still makes the BEST

The Fellows Cutters you order today have unequalled experience behind their manufacture: the first gear shaper cutter ever made was designed, produced and patented by Fellows in 1897. Hundreds of thousands of Fellows Cutters have been made and used on gear production lines since that time.

This vast experience has resulted in constant progress, year after year, in cutter design and manufacture. Today, new gear and cutter designs are checked on a high-speed electronic computer which permits complete mathematical study of all possibilities. Constant advances in metallurgy and in manufacturing methods assure outstanding cutter performance on every gear production job.

A booklet, "Fellows Gear Shaper Cutters", covers the subject in detail. It includes tables of stock cutters, design considerations, sharpening methods, and other information. For a copy, contact any Fellows office.



THE FELLOWS GEAR SHAPER COMPANY

78 River Street, Springfield, Vermont

Branch Offices: 1048 North Woodward Avenue, Royal Oak, Mich.

150 West Pleasant Avenue, Maywood, N.J.

5835 West North Avenue, Chicago 39

6214 West Manchester Avenue, Los Angeles 45



Fellows Gear Production Equipment

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November, 1958

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"To meet Today's and Tomorrow's Complex Machining Problems

we bought a . . .
BULLARD
H.B.M. model 75



This statement by Mr. Reed Clark,
General Manager, C. & H. Machine and Engineering
Company, Berkeley, California summarizes, after thoroughly
investigating and comparing competitive machines, their conclusion

If you are planning to purchase a horizontal boring machine, we invite you to compare, feature for feature, the Bullard H.B.M., Model 75 with other machines in its field. You will discover that — "To Cut Costs When Cutting Metal — Buy Bullard" — is sound advice.

A call to your Bullard Sales Representative or Distributor will bring you the complete story.



THE BULLARD COMPANY 286 Canfield Ave. Bridgeport 9, Connecticut



Smart planning on Simplimatic holds f.t.f. time to 1.7 min. on $6\frac{1}{2}$ " diam., 3.3 min. on $10\frac{3}{4}$ " diam. workpieces.

How OTM Corp. cuts costs machining parts in 13 sizes

Handles each part in single chucking, using Simplimatic with back-facing attachments and two-speed motor

You may get ideas from the way OTM Corporation, Houston, Texas, machines steel welding neck flanges and welding necks—with each part in 13 different sizes—completing each part in a single chucking and holding change-over time to an absolute minimum.

Here's how the job is done on a Gisholt Simplimatic Automatic Lathe: Facing, grooving, boring and chamfering operations are performed from tools on short tool slides, with T-slotted tops for quick adjustment. Relieving the boring tool at the end of the cut eliminates tool tracks. Simultaneously, a special back-facing attachment works through the spindle to shave-face and chamfer the O.D. on the hub. A power chuck wrench operates the scroll chuck and permits mounting this attachment in the spindle bore. A two-speed motor

provides correct surface speed and permits switching from high speed (for turning and facing) to low speed (for grooving operation) and back again, during the Simplimatic's automatic machining cycle.

Here, again, the Gisholt MASTERLINE Simplimatic Automatic Lathe saves a manufacturer the cost of a special machine. Its extra wide platen table provides ample space for an infinite number of slide and tool arrangements—and its table feed permits tools to engage with the work or perform additional machining operations before actual slide movements begin. Ask your Gisholt Representative to show you how the Simplimatic performs special machine functions at standard machine prices—on your product and under your production conditions.



GISHOLT

MACHINE COMPANY

Madison 10, Wisconsin, U.S.A.

WRITE GISHOLT TODAY for new Catalog 1159-C on Gisholt MASTERLINE Simplimatic Automatic Lathe. Shows 39 typical jobs—fully illustrated.

ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY REBUILT MACHINES WITH NEW MACHINE GUARANTEE
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November, 1958

Illustration and captioning—CONTRIBUTOR

5 Basic Reasons why MARVEL HACK SAWS CUT-OFF MORE ACCURATELY...

The consistently accurate performance of MARVEL Heavy Duty Hack Saws is no accident. MARVEL engineers knew, many years ago, that to produce and maintain accurate cutting-off, a hack saw must be designed and built like a fine machine tool.

Some of the basic design principles built into the modern MARVEL Hack Sawing System that makes it the most accurate cutting-off method you can use are:

1. V-Way Design...Greater Rigidity

Upright and Saddle are precision machined and fitted to form a rigid, integral unit capable of withstanding any cutting load with no deflection or side movement.

2. Anti-Friction Bearing Construction

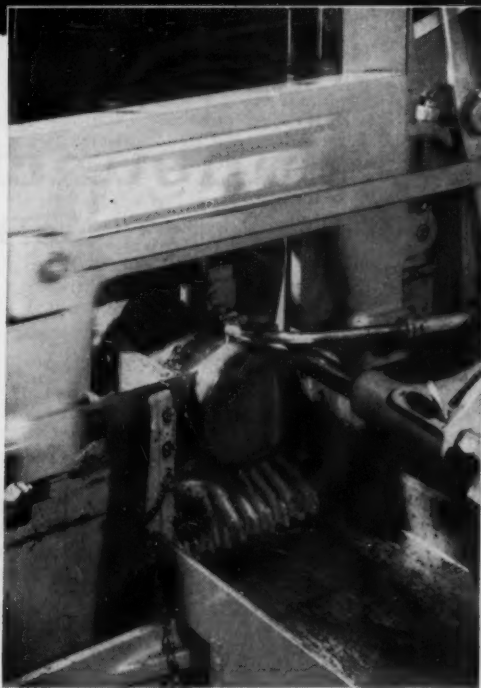
Anti-friction ball or roller bearings are used at all load carrying points. Even the strongly braced saw frame reciprocates on heavy duty, fully enclosed preloaded ball bearings which provide permanent, frictionless rigidity and true-running, straight line cutting strokes.

3. Minimum Blade Frame Reach

Close-coupled design and crank lever action of MARVEL Saws keeps the saw frame and blade reach very short in relation to the vertical V-ways on which the unit is mounted. This insures optimum rigidity, even under the most severe operating conditions.

4. Positive Relief Blade Lift

On the return stroke, positive relief lift raises the blade to provide proper and "cushioned" feed-in on the next cutting stroke. This prolongs blade sharpness, life and accuracy.



5. Rigid Cutting Tool

Cutting-off accuracy requires a rigidly held, relatively short cutting tool. MARVEL Unbreakable High-Speed-Edge Hack Saw Blades, which combine a narrow high speed steel cutting edge permanently welded to a tough alloy steel body, can be tensioned from 200% to 300% more taut than ordinary blades. This provides a most rigid cutting edge.

Write for the MARVEL Catalog and the complete story on
MARVEL METAL CUTTING SAWS

PS-1306



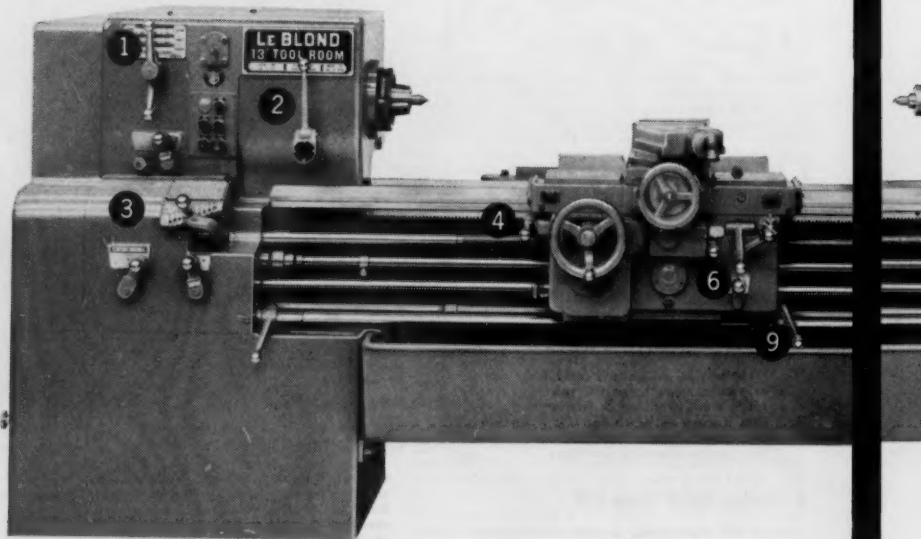
ARMSTRONG-BLUM MFG. CO.
5700 W. BLOOMINGDALE AVE., CHICAGO 39, ILL.

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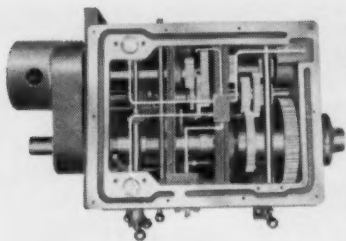
November, 1958

modern machine shop 21

announcing ... the 13" LeBlond precision

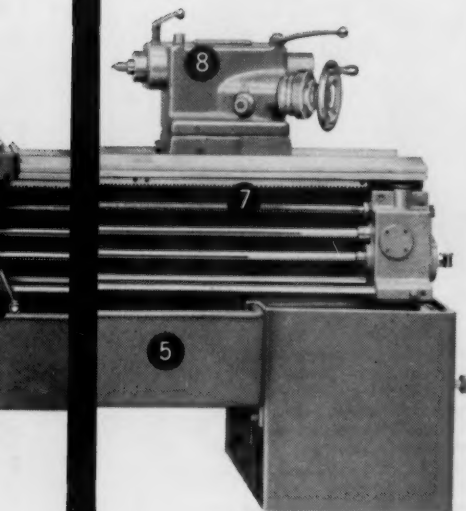


- ❶ 27 spindle speeds easily chosen by direct-reading color plate
- ❷ Combination gear-belt drive headstock
- ❸ Totally enclosed quick change box; 60 feeds and threads
- ❹ Single-lever 4-way power rapid traverse
- ❺ Chip pan slides in grooves; easy clean out
- ❻ One-piece totally enclosed apron; ample carriage bearing surface
- ❼ Rigidly ribbed bed with hardened and ground steel ways
- ❽ 2-speed thrust-lock tailstock with quick-set length dial
- ❾ Apron controlled leadscrew reverse



e on

new toolroom lathe



combination gear-belt headstock

The headstock of the new LeBlond 13" Precision Toolroom Lathe incorporates combination gear-belt drive, delivers 27 speeds ranging from 18 to 2250 rpm. A timing-type non-slip belt is used for the nine high speeds; lower speeds are gear-driven. A color index plate makes speed selection easy for the operator. A constant speed motor supplies up to 20 h.p. to the gear train through an electric clutch and brake (standard equipment).

adjustments for starting, stopping, jogging

Heavy work pieces are brought up to speed safely with rheostatic controls to the electric clutch and brake. Torque applied for the first six seconds is adjustable to any percentage of full torque. Similar adjustments for stopping and jogging.

high-speed spindle mounting

Front and center bearings are Timkens in cone-adjusted mountings. The center bearing cup is mounted in a special high speed precision adapter which relieves potential excessive preload—resulting from the inevitable heat of high-speed operation. Front and center mountings are thrust bearings. The original factory-set preload can handle both high and low speeds—no need to reset bearing adjustments in the field.

spur gear design

Minimizes no-load horsepower. Only gears for a specific speed are engaged. Spur gears are fine pitched and wide to give better tooth action and great load carrying capacity. Short, heavy shafts minimize deflection, are mounted on anti-friction bearings. Spindle is completely ground, nose is hardened. Taper nose key drive is positive, simplifies set-up. Provision for multiple-start threads is made with a large easy-to-read dial at the rear of the spindle. A forced feed system lubricates every moving part in the headstock with filtered oil.

other models available

In addition to the new 13" Toolroom, a new 13" LeBlond Heavy Duty Lathe is also available. Both can be obtained in plain bed gap models. See your LeBlond Distributor or write today for complete details. Ask for Bulletin T-103E (toolroom) or Bulletin HD-103E (heavy duty)

...cut with confidence

THE R. K. LEBLOND MACHINE TOOL COMPANY

Cincinnati 8, Ohio



World's Largest Builder of a Complete Line of Lathes for More Than 71 Years

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November, 1958

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*America's
Most Complete Line
of Self-Protected
Bearings*

"Cartridge" Labyrinth
Sealed Bearing
(Removable Seal)

"Cartridge" 4-way Finger
Sealed Bearing

NORMA-HOFFMANN Sealed Bearings

**Give You Dependable
Trouble-Free Performance**

Felt Sealed Bearing
(Removable Seal)

Metal Shielded
Bearing

"Flexilast" Rubber
Sealed Bearing

There are good reasons why Norma-Hoffmann Sealed Bearings give such outstanding performance under all types of operating conditions.

First — the efficient seals, metal, synthetic rubber, or felt, keep grease in . . . keep dirt, dust and other harmful material out. The special seal designs eliminate race distortion, assure dimensional exactness and quiet operation. They simplify mountings . . . speed up assembly.

Second — all Norma-Hoffmann sealed bearings are "factory packed" with a carefully metered quantity of high quality filtered grease . . . grease that is highly resistant to oxidation . . . grease chosen to meet specific operating temperature requirements.

Result — trouble-free performance over long periods without regreasing.

Investigate Norma-Hoffmann sealed and other bearings for your equipment. Write for engineering assistance and catalog.

Special Seal Design PLUS the right grease for
the application insures against dry bearings.



precision ball, roller & thrust bearings

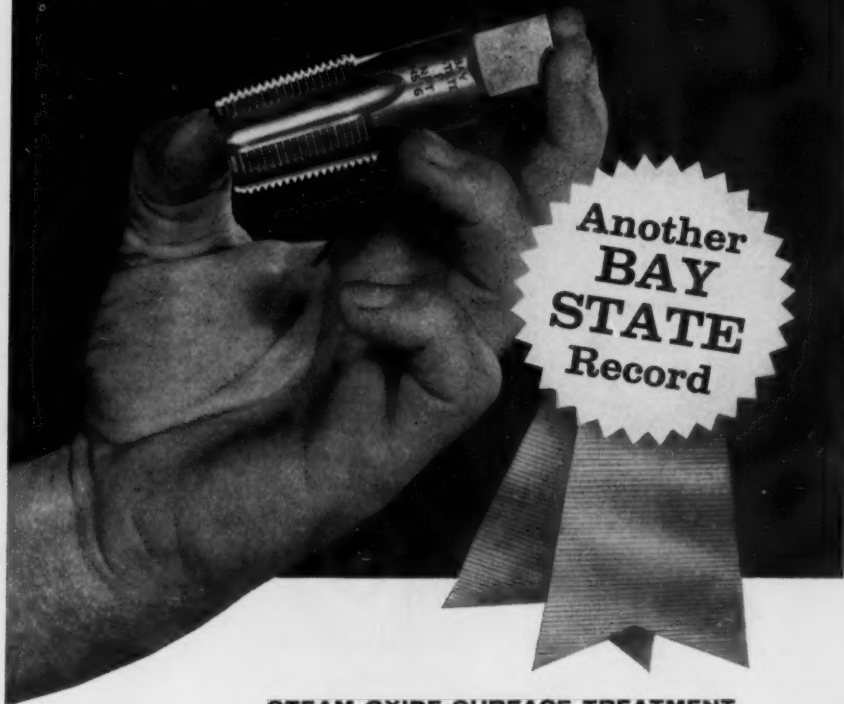
NORMA-HOFFMANN
BEARINGS CORPORATION • STAMFORD, CONN.

Founded 1911

FIELD OFFICES: Philadelphia • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Kansas City • Los Angeles • San Francisco • Seattle

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Number 3 in a Series



**STEAM OXIDE SURFACE TREATMENT
IMPROVES THREAD QUALITY
AND INCREASES TAP LIFE**

Oxidizing in a steam atmosphere is a supplementary heat treating process providing Bay State taps with a hard lubricated surface which improves cutting performance by reducing galling.

Steam Oxide surface treatment is particularly effective in certain pipe tapping operations.

Other Bay State surface treatments include:

Liquid Nitriding — particularly effective for tapping cast iron, stainless steel, plastics, as well as any abrasive material.

Flash chrome plating — recommended for tapping copper, zinc base die castings and cold forming steels.

Order Bay State . . . and Requisition a Record from Specialists in Precision Tap Performance.



On the nearby shelves of your Industrial Supply Distributor

BAY STATE TAPS

Bay State Tap & Die Company • Mansfield, Massachusetts

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November, 1958

modern machine shop 25

new

GREAVES

2-XH Milling Machines

**more
power at
the cutter!**

The completely new GREAVES No. 2-XH Milling Machine brings added versatility, increased operational ease, and more power where it's needed most . . . *at the cutter!*

It utilizes two motors, one for spindle drive; a separate motor for moving table, saddle and knee. Compare this and the other outstanding features of the new Greaves Mill. You'll see why Greaves is "The MOST Mill for the LEAST Money."

Write for detailed literature!

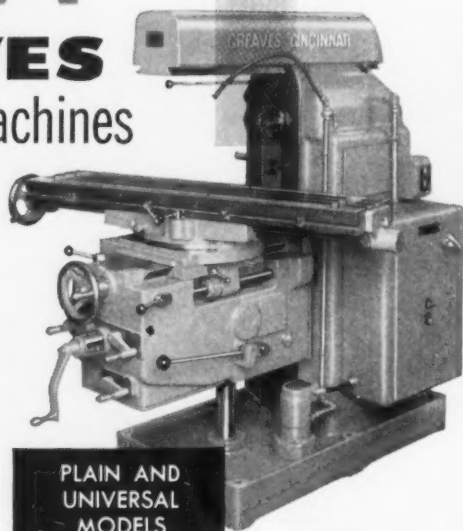
GREAVES

MACHINE TOOL DIVISION

J. A. FAY & EGAN COMPANY

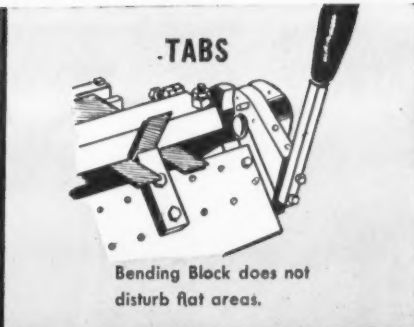
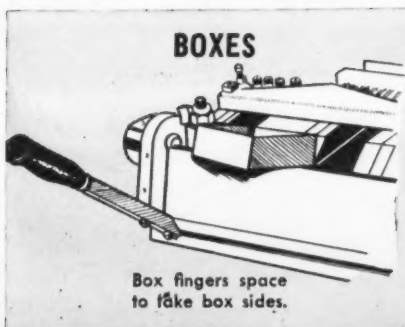
2700 Eastern Avenue, Cincinnati 2, Ohio

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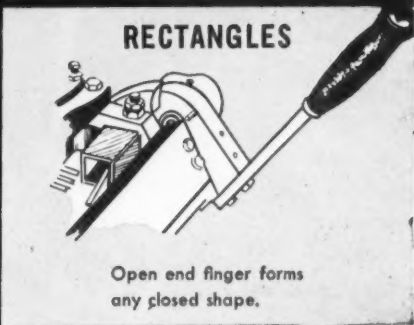
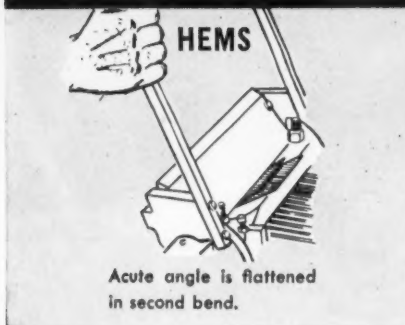


**PLAIN AND
UNIVERSAL
MODELS**

- Wide range of speed/feed combinations for any type material, any type job.
- Heavy, internally ribbed column casting and heavy duty rectangular overarm for maximum rigidity.
- Large, heavy-duty knee, saddle and table provide accuracy for all types of milling.
- New 7 1/2 HP spindle drive motor, with separate motor for movable components, provides extra power for heavy milling.
- Easy-to-reach controls. Handwheels and vertical crank disengage automatically when not in use.
- New rapid traverse lever within operating control area.
- Separate drive motor for table, saddle and knee provides more smooth balanced power at the cutter.



HOW TO FORM... *Sheet Materials*



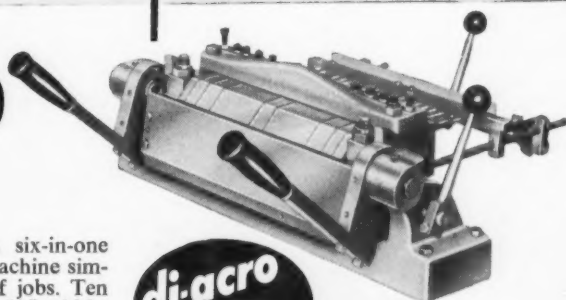
with a **DI-ACRO BRAKE**

The Di-Acro Brake is a six-in-one precision metal working machine simply tooled for a variety of jobs. Ten models in 6", 12", 18" and 24" widths handle up to 16 gauge mild sheet steel.

Consult the yellow pages of your phone book under Machinery-Machine Tools for the name of your nearest Di-Acro distributor or write for 16 page "Handy Guide" to Di-Acro Brakes.



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pronounced
die-ack-ro

**O'NEIL-IRWIN
MANUFACTURING CO.**

306 Eighth Avenue • Lake City, Minnesota

November, 1958

modern machine shop 27

THE GAGE THAT REMEMBERS

Use a Pipe Machinery **CORRELCHek** for
faster, more accurate, and complete
inspection of pipe threads (ANPT, NPTF, NPT and NGT)

Simple to operate:—

Set the instrument with Master Gages.

Check product to the proper tolerances

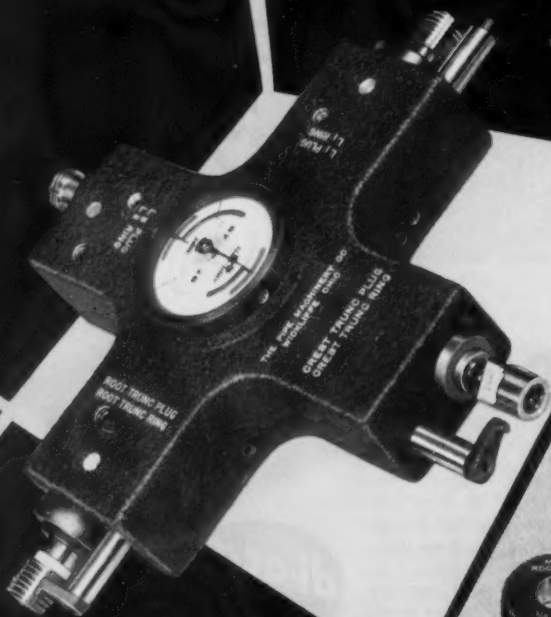
indicated by color zones on the dial.

Torque controlled to prevent over exertion of
pressure by inspectors.

Eliminate discussions and arguments.

Write today for full details.

PATENT NO. 2,833,053



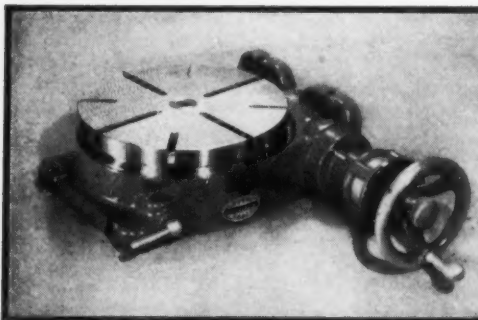
THE PIPE MACHINERY COMPANY

29100 Lakeland Blvd. • Wickliffe, Ohio

Greater Cleveland

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**For angular spacing jobs so precise
you could never handle them before**



**A Rotary Table
accurate to
 ± 3 sec. in 360°
(USING CHART)**

No. 2 Moore 11-Inch Rotary Table, developed by the builder of the Jig Borer and Jig Grinder.

**THE FOLLOWING ACCURACY
BUILT FOR SHOP USE:**

All points in 90° increments, from zero, $\pm 1\frac{1}{2}$ sec.

All points in 18° increments, from zero, ± 2 sec.

All points in 2° increments, from zero, ± 4 sec.

Worm accuracy, ± 1 sec.

Repetition of settings, ± 1 sec.

4 sec. = .0001" on 10" dia.

How many jobs have slipped by you because the angular spacing requirements were just too much for your equipment?

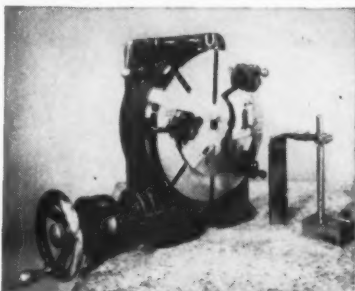
With Moore's new 11-Inch Rotary Table, you can easily handle the most precise angular measurements. Having an overall performance accuracy of ± 6 seconds throughout the entire 360° , this table is already being used successfully by several leading companies on government-sponsored precision jobs never before accomplished.

This extreme accuracy is achieved by a non-disengagable, thread-ground worm, combined with accurately spaced teeth of its mating gear. An ultra-sensitive method of angular measurement—interferometric inspection and calibration—used industrially for the first time, assures tooth spacing accuracy within less than ± 4 seconds.

You can use this rotary table for countless precision spacing applications on jig borers and jig grinders. Examples: Spacing holes in a circle on either machine; set at right angle for additional machining and inspection jobs; with its companion unit, the new No. 2 Sine Plate, to produce compound angle settings. Write today for Bulletin RT2.

MOORE SPECIAL TOOL COMPANY, INC.

730 Union Avenue, Bridgeport 7, Connecticut



Accurate in vertical as well as horizontal position. Additional vernier permits normal reading even in vertical position.



Accuracy assured by interferometric inspection and calibration. This is the first time industry has used light-wave measuring methods for precise division of the circle.

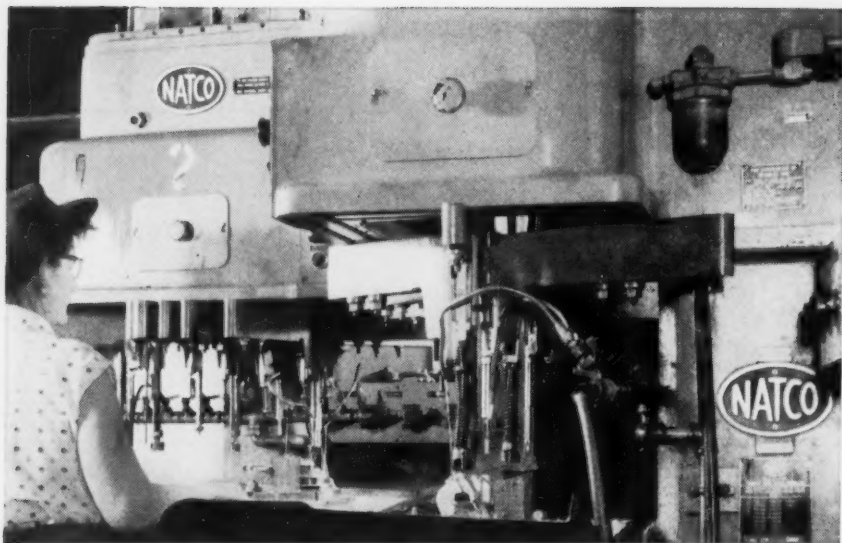
ADD  **TO YOUR TOOLROOM**

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

For more data circle 330 on Postpaid Card

November, 1958

modern machine shop 29



Ten Natcos like these replaced 170 single spindles!

It's "reduce costs or else" in the hotly competitive carburetor business. That's why Zenith Carburetor Div. of Bendix Aviation Corp. embarked on a tooling program which resulted in substantial savings per casting machined.

Ten multiple spindle H-6 Natcos provided the greatest savings per machine dollar spent. By combining drilling and tapping operations, the Natcos eliminated the need for 170 single spindles. Look at the cost comparisons on two parts, for example—a die-cast cover and fuel bowl.

Formerly, the cover was machined by five operators using ten single spindles with ten jigs. The fuel bowl was formerly

run by two operators on four single spindles using four individual jigs. Now these parts are run on two Natcos by a single operator at a direct cost savings of 81% on the cover and 70% on the fuel bowl.

Wherever hole-machining operations are performed one at a time, you'll find outstanding opportunities for cost reduction. Standard multi-spindle Natcos range from 1 hp, 10-spindle high-speed machines to giant heavy duties with 50 hp and up to 72 spindles. Natco also builds a complete line of special way-type, index and transfer machines.

A Natco field engineer can help you with your cost-reduction and production problems. Call or write today.



Somewhere in Natco's experience is a money-saving idea for YOU!

NATIONAL AUTOMATIC TOOL COMPANY, INC.

Richmond, Indiana

Natco offices in Chicago, Detroit, New York, Buffalo, Boston, Philadelphia, Cleveland and Los Angeles; distributors in other cities.



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30 modern machine shop

November, 1958

For more data on advertisement on opposite page, circle 332 on Postpaid Card →



Be Right... Buy Bearings By ALL the Numbers . . . from Bearings, Inc.

It is not enough to buy bearings by the bearing number alone! Those prefix and suffix numbers often determine bearing success or failure. Cost, too, is determined by those numbers for they show degree of precision, internal clearance and the amount of preloading.

How can you always make sure you get the right bearing for every application? It's simple! Contact

our nearest branch and we will deliver bearings in the manufacturer's original sealed box. Every bearing is guaranteed by the maker and ourselves to be as specified on the box. Each bearing will be "factory-fresh" to give you best possible performance and life. Our representatives are qualified to assist in determining correct precision and fit on all bearings in your equipment.

Providing bearing service
in the North ➤

and

in the South ➤

BEARINGS, INC.

OHIO: Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton • Lima • Lockland • Mansfield • Toledo • Youngstown • Zanesville
INDIANA: Ft. Wayne • Indianapolis • Muncie • Terre Haute • PENNSYLVANIA: Erie • Johnstown • Philadelphia • Pittsburgh • York
WEST VIRGINIA: Charleston • Huntington • Parkersburg • Wheeling • NEW JERSEY: Camden
NEW YORK: Buffalo, Balanrol Corp. • MARYLAND: Baltimore • DELAWARE: Wilmington

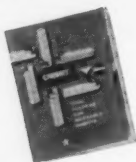
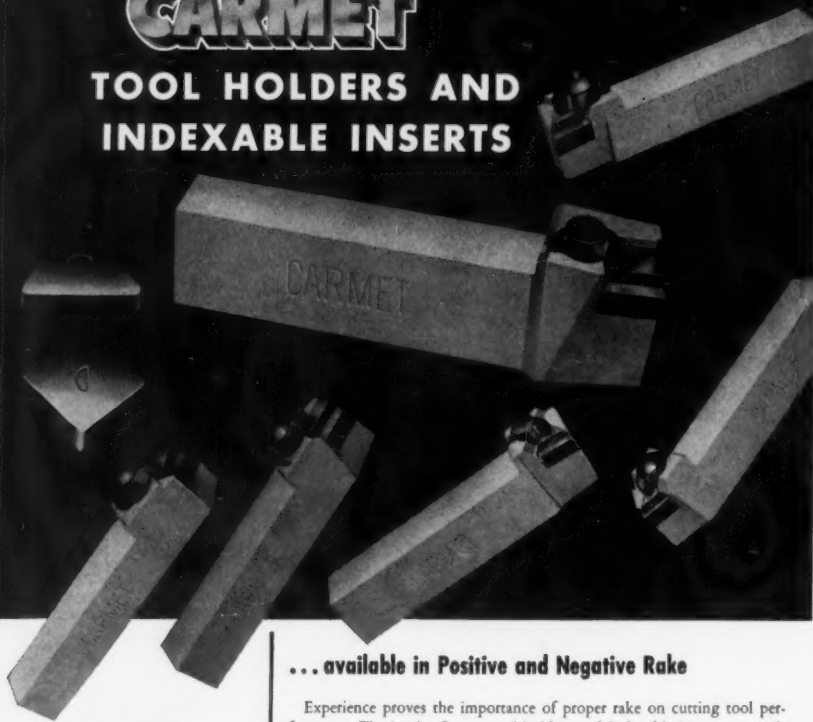
DIXIE BEARINGS, INC.

FLORIDA: Jacksonville • GEORGIA: Atlanta • KENTUCKY: Louisville • LOUISIANA: Baton Rouge • New Orleans
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Designed for your Cutting Tool Program...

CARMET

**TOOL HOLDERS AND
INDEXABLE INSERTS**



Write for this **NEW CATALOG:**
**CARMET TOOL HOLDERS
and INDEXABLE INSERTS**

Expanded to 16 pages, this latest edition contains specifications of Carmet tool holders and indexable inserts, replacement parts for tool holders, and information on choosing the proper carbide grade for the job.

ADDRESS DEPT. MS-11

www 0000

... available in Positive and Negative Rake

Experience proves the importance of proper rake on cutting tool performance. That's why Carmet tool holders and Indexable inserts are available in *both* positive rake (for light cutting on easy-to-machine materials) and negative rake (for heavy cutting on high tensile materials).

CHECK THESE FEATURES

- Up to eight cutting edges on each carbide insert.
- Grinding is eliminated—no special reconditioning equipment needed.
- Each insert is permanently marked for easy grade identification.
- Tool holders cadmium plated to resist corrosion and chip erosion.
- Tool holder design permits quick, accurate indexing of inserts to new cutting edge.
- Inserts cost but a few pennies per each new cutting edge.

Ask your A-L representative or distributor for engineering assistance in choosing the right tool for your requirements from Carmet's complete line.
Allegheny Ludlum Steel Corporation, Carmet Division, Detroit 20, Michigan.

For all your **CARBIDE** needs, call

ALLEGHENY LUDLUM

Branch offices and distributors in all principal cities



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NOVEMBER, 1958

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ADVERTISEMENTS

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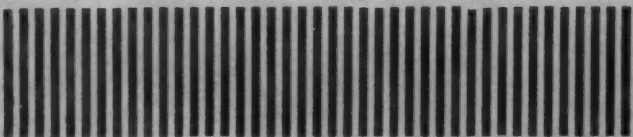
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PERMIT No. 1702
CINCINNATI, OHIO

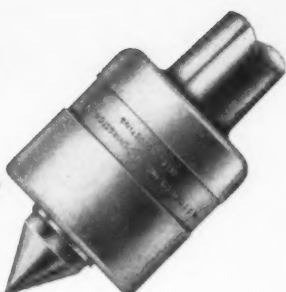




Famous Perfection
Grinding Live Center



H.S.S. and Carbide
Accurate Detachable Points



Expansion Compensating
Lathe Centers

ANNOUNCING THE FIRST COMPLETE LINE OF PRECISION-BUILT LIVE CENTERS

**INCLUDING 5 TYPES OF
EXPANSION COMPENSATING CENTERS**

- the only complete line
- the only guaranteed self-adjusting
live center

INTRODUCING J & S Tool Company's complete new line of live centers with accuracy better than .0001", with these features:

- Guaranteed one year.
- Self-adjusting bearing take-up.
- RPM speeds up to capacity of present-day machines.
- Correct capacity rating.
- Hardened and ground throughout.

Write today for a free copy of the J & S Live Center Catalog.

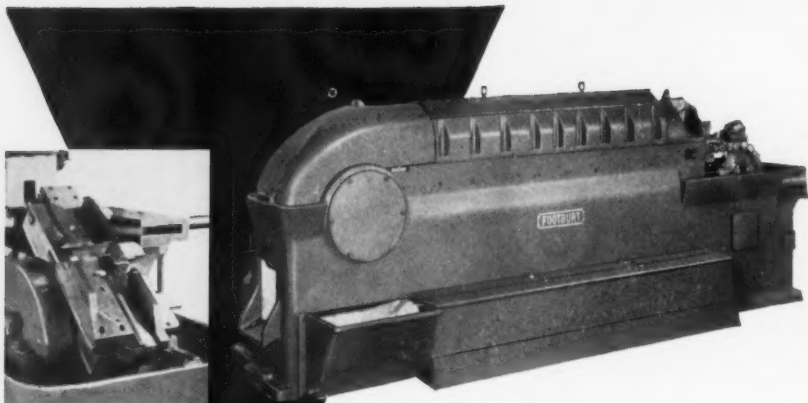
J & S TOOL CO., INC.

871 Dorsa Avenue

LIVINGSTON, NEW JERSEY

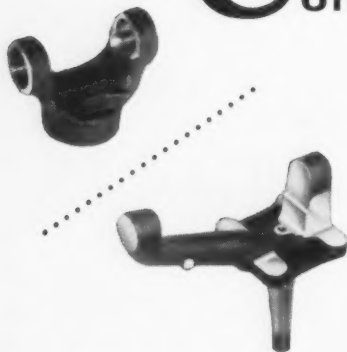
J & S TOOL CO., INC., ALSO MANUFACTURES FLUIDMOTION WHEEL DRESSERS
CLAMPS • NO-BEND MILLING ARBORS AND CLAMPCUT MILLING VISES

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TO CUT MACHINING COSTS,
MACHINE FASTER WITH

.....C Continuous broaching



Higher machining production than ever achieved by any other method has been made possible in many cases through the use of the Footburt Continuous Surface Broaching Machines. In most cases, production is limited only by the speed at which parts can be loaded into the self-clamping fixture. Unloading is automatic. If you have a problem of high production on small parts, send blueprints and hourly requirements.

THE FOOTE-BURT COMPANY
Cleveland 8, Ohio

Detroit Office: 24632 Northwestern Hwy., Detroit 35, Mich.

ENGINEERED FOR PRODUCTION

Write for Circular No. 503

FOOTBURT

PIONEERS IN SURFACE BROACHING

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"Our new 618's", reports Bob Pringle, General Manager of Winslow Manufacturing, Cleveland, "are what we've needed to help us stay on top as the first name in precision control." With Abrasive's modern design and 'operator engineered' features, the story is the same in precision shops all over the country.

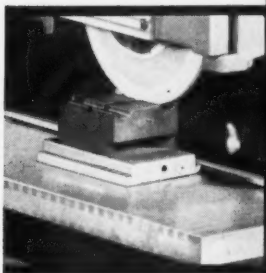
"Easy Accuracy"

**That's what one
Big Cleveland Gage Maker
says about**

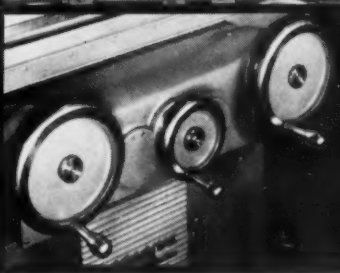
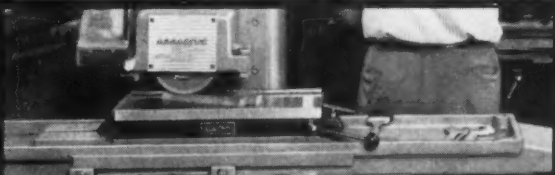
ABRASIVE
SIX EIGHTEEN

**Hand Feed
Precision
Surface Grinders**

At Winslow, "the feature which most impressed our employees is the fast table travel. This makes it much easier to grind hardened material." And well it should! The 618 rides smoothly on precision anti-friction rollers. It is actuated by a smooth cable and drum drive. You get 6" of table movement with each turn of the 8" handwheel.



Bob Pringle goes on to report, "we have used the machine primarily for gage work and find that the finish is very good. It's excellent for side grinding, too." Heavy, rugged, deeply-ribbed construction plus the advantages in Abrasive's motorized spindle and wheel-head assembly make high finishes easy.



Precision and efficiency are vital at Winslow, and they found "the good repeatability of the 618 dial settings to be of special advantage." All operators appreciate the comfortable, balanced feel of the smooth recessed handwheels, available either right or left-handed. They like the comfort and convenience of the controls all located on the same waist-high plane.



It makes good sense for you, too, to look into the many profit-producing advantages of the new Abrasive 618's. Without obligation our colorful eight-page tell-all brochure is yours. Write for it, today!

**ABRASIVE MACHINE TOOL
COMPANY**

Dexter Road
East Providence 14, Rhode Island

For more data circle 336 on Postpaid Card

November, 1958

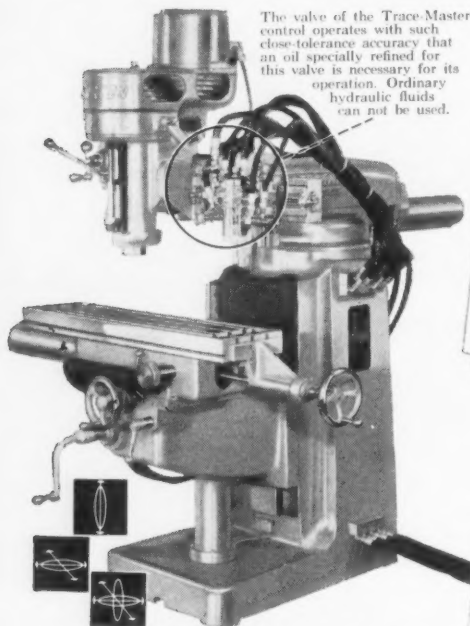
modern machine shop 35

Designed for the "Missile Age"

GORTON

"Trace-Master" Mastermil

with exclusive combination of sustained toolroom accuracy
and precision-built Trace-Master Hydraulic tracer control



The valve of the Trace-Master control operates with such close-tolerance accuracy that an oil specially refined for this valve is necessary for its operation. Ordinary hydraulic fluids can not be used.

Nowhere Else will you find this combination

1. TWO H.P. spindle motor
2. Finest Milling Head in its class
3. 80 to 5,600 RPM spindle speeds
4. Rigidity . . . (2,800 lbs net weight)
5. Extra long saddle

Nowhere Else will you find this versatility

1. Production profiling
2. Scanning
3. Duplicating . . . die and mold work
4. Milling . . . conventional and climb
5. Boring

3 Models Available (1) 180° Vertical Hydraulic Feed to Knee (2) 360° Cross Hydraulic Feed to Ram and Longitudinal Hydraulic Feed to Table (3) 3D Hydraulic feed to knee, ram and table for 3-dimensional work. Trace-Master controls can be furnished with the Model 1-22 Mastermil illustrated above or the Model 9-J Super-Speed Vertical Mill with single spindle, twin spindles and/or six inch higher column for additional vertical capacity

Write for Bulletin
2771-1711



GEORGE GORTON MACHINE CO.

1711 RACINE STREET

RACINE, WISCONSIN

SINCE 1893

Tracer-Controlled Pantographs, Duplicators—standard and special . . . Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

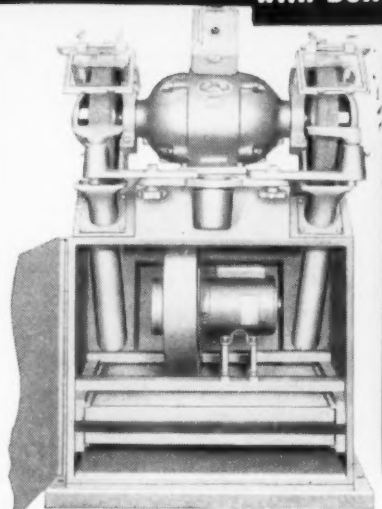
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NEW 2-in-1



GENERAL PURPOSE GRINDER

with Built-in **DUST COLLECTOR**

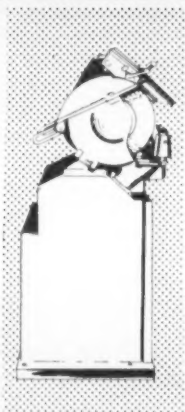


Grinder has totally enclosed motor, enclosed adjustable wheel guards, dustproof, anti-friction permanently sealed bearings. Wheels removed easily and quickly. Dynamically precision balanced.

Dust Collector adds to comfort and efficiency of workmen and increases life of equipment. Sheet steel cabinet. Unit rated at 1000 CFM 4" pressure.

*Compact ...
Efficient ...
Space-Saving
Model 504*

1, 2, 3 and 5 H.P. TYPES
Fits neatly into your
plant layout without
waste space ... entire
unit only 32 1/2 inches
wide and
20 inches deep.



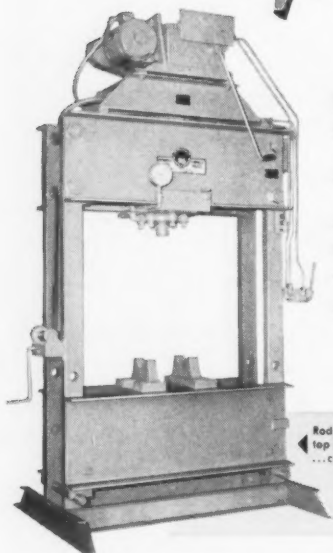
Write for
new
bulletins
and
catalogs of
complete
line.

Over
60 Years
of Service
to Industry

The United States Electrical Tool Co.
3640 LLEWELLYN ST., CINCINNATI 23, OHIO

For more data circle 338 on Postpaid Card

A *Rodgers* Shop Press is **BEST for YOU!**

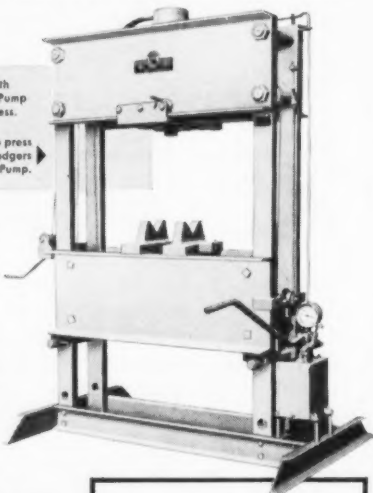


← Rodgers 100 ton shop press with top mounted Greenlee Power Pump ... cylinder travels width of press.

→ Rodgers 100 ton shop press with Rodgers 2 speed Hand Pump.

HERE'S WHY:

- **LONGEST RAM TRAVEL** with maximum hydraulic power throughout entire stroke.
- **REMOVABLE CYLINDER** for independent hydraulic power away from the press.
- **CYLINDER TRAVEL** full width of press, either way.
- **OPEN ENDS** allow long pieces to extend through sides of press.
- **EXTRA WIDE** inside work space to handle bigger jobs more easily.
- **GREATER STRENGTH** with heavy bar stock sides and pins—bearing blocks support bolster to give uniform distribution of pressure.



WHEN YOU INVEST in a shop press it is more important to compare performance than initial cost!

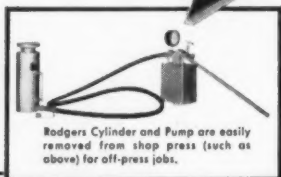
Rodgers Shop Presses are designed and built for the most versatile service, and longest trouble-free life. In the shop they handle hundreds of diversified jobs... pressing, bending, straightening, assembling. For field work the Rodgers cylinder and pump are easily removed from the press, making an ideal portable power unit for jacking, lifting, heavy shaft removal and similar work.

Rodgers produces the most complete line of shop presses available—capacities from 60 to 400 tons—in varied standard models with power pumps, top mounted or placed at the side—or hand pumps with 2 or 3 speeds.

When you compare shop press performance and cost you will find a Rodgers is best for you, too. Ask your Rodgers Representative for complete details—or write us.

SEND FOR NEW CATALOG...

It gives useful information and complete specifications.



Rodgers Cylinder and Pump are easily removed from shop press (such as above) for off-press jobs.



RODGERS HYDRAULIC, Inc.

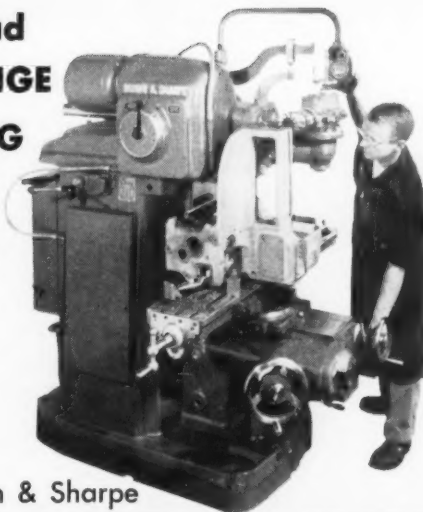
Pioneers in High Pressure Hydraulics Since 1932

7447 WALKER STREET • MINNEAPOLIS 26, MINNESOTA

For more data circle 339 on Postpaid Card

**'way out ahead
in WORK RANGE
-in OPERATING
ECONOMY**

**For tools, dies, molds,
for prototype work,
for maintenance,
for any milling job—**



**COMPARE
this capacity!**

28" Table feed
12" Transverse feed
25" Face of column
to center line of
vertical spindle
20 1/2" Vertical feed
3 1/2" Hand movement of
quill in universal head.

Spindle Speeds
Horizontal Spindle
40 to 1530
Universal Head
80 to 3060

The Brown & Sharpe
RANGEMASTER
Universal & Plain Milling Machines—sliding head type

LOWER ORIGINAL INVESTMENT

On the RANGEMASTER you can take No. 2 size cuts on work pieces whose physical dimensions would normally require the capacity of a more expensive No. 3 or larger size machine.

LOWER SET-UP AND OPERATION COSTS

With the RANGEMASTER you *clamp the work piece once*, then machine all around it—mill, drill, or bore from any angle. You avoid relocating and re-alignment, with consequent risk of errors. You get more hours of machining time, and minimize set-up time.

LOWER TOOLING COSTS

In the RANGEMASTER, both horizontal and vertical spindles have the same standard No. 40 M.M. taper for interchangeability of tooling. One set of tooling serves for multiple operations. There's no need for costly compounding of tool inventory.


Compare all the features of the RANGEMASTER, Universal or Plain Type, and you'll agree it's by far your best buy in its class. For details, write: Brown & Sharpe Mfg. Co., Providence 1, R. I.

**ALL THE ADVANTAGES OF
A "RAM-TYPE" MACHINE
WITH NO SACRIFICE
IN CUTTING ABILITY**

In the Rangemaster, all the following features are the same as in a conventional knee-type milling machine of corresponding size:

- SAME SPINDLE MOUNTING —**
- SAME SIZE "BULL" GEAR —**
- SAME RANGE AND NUMBER
OF SPINDLE SPEEDS —**
- SAME DIRECT DRIVE
to both spindles,
utilizing full power**

PROGRESS IN PRECISION  FOR 125 YEARS

Brown & Sharpe 



MILLING, GRINDING, AND SCREW MACHINES • MACHINE TOOL ACCESSORIES

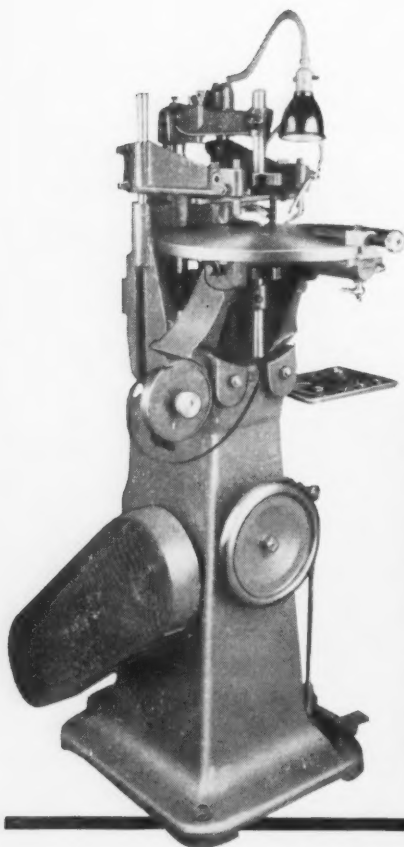
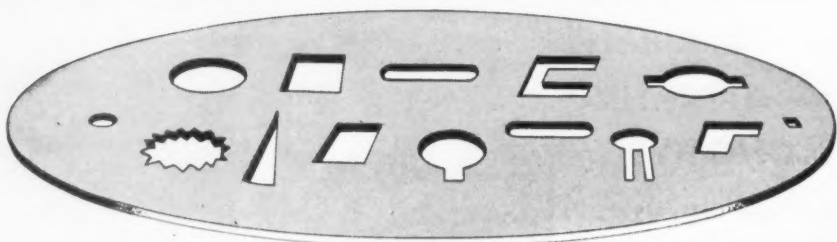
PRECISION TOOLS • HYDRAULIC PRODUCTS • CUTTERS

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November, 1958

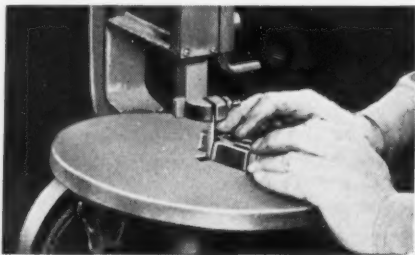
modern machine shop 39

FOR CONTOURS LIKE THESE . . .



Freak contours — more conventional shapes — internal or external forms. In any case, you'll save valuable time by producing the job on an Oliver of Adrian contour sawing and filing machine.

Parts for jigs and fixtures, dies, gages, templates and special machine production can be shaped to dimension faster — easier — at less cost. No hand filing or semi-finishing operations. Better investigate Oliver today. Just write. Available in five sizes — bench or pedestal.



OLIVER of ADRIAN

OLIVER INSTRUMENT COMPANY

1430 E. Maumee St. • Adrian, Michigan

For more data circle 341 on Postpaid Card

**Automatic feeding
and setting with...**

T-J

**Speeds up riveting
and clinching!**

It's a quick step to *faster assembly* and *reduced labor costs* when you put T-J Rivitors and Clinchers in your production picture! These performance-proved machines are suited to a wide range of assembly jobs for aircraft, automotive, farm machinery riveting jobs of all kinds.

T-J RIVITORS automatically feed and set solid rivets with high production. Electrically powered Rivitor sets solid steel rivets up to $\frac{7}{8}$ " long. Throat depths 8" to 36".

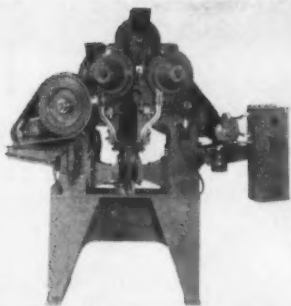
T-J CLINCHORS set clinch nuts with fully automatic operation, controlled by a single foot pedal. Available in Underfeed and Gravity feed models, throat depths 8" to 36".

Send today for these helpful references: Rivitor bulletins 646 and 555 . . . Clinchor bulletin 555. The Tomkins-Johnson Co., Jackson, Mich.

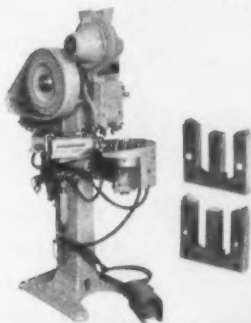


TOMKINS-JOHNSON

RIVITORS, BID AND HYDRAULIC CYLINDERS, CUTTERS, CLINCHORS



RIVETS 4 AT A TIME! Special quadruple riveting unit, incorporating two Model "RR" Twin Rivitors, mounted on a special welded steel base. Equipped with air-operated hold down mechanism and a safety air trip arrangement. Tooled for riveting left hand and right hand automotive muffler bracket assemblies.



SPECIAL TWIN RIVITOR! Tooled for 6 station indexing fixture, incorporating automatic clamping and ejecting mechanisms, for riveting laminated armature assemblies.



T-J CLINCHOR adaptable to a wide range of clinch nut setting problems. Gravity feed model shown here.

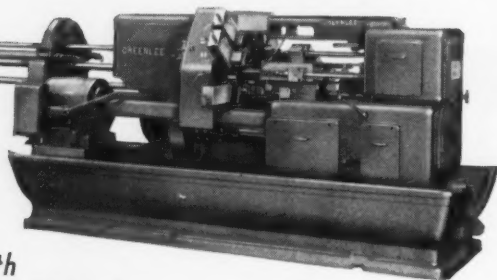
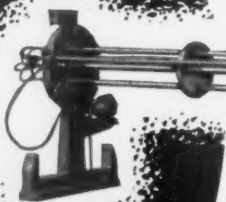
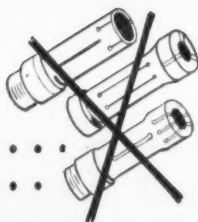
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modern machine shop 41

ELIMINATE

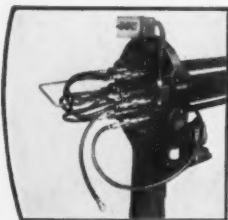
STOCK PUSHERS
FEEDOUT CAMS



with GREENLEE AIR-FEED AUTOMATICS

You don't need costly stock pushers and feedout cams with Greenlee Air-Feed Automatics. Air lines are connected to the tubes by quick couplings. Vacuum pumps withdraw pistons for fast restocking. Ask your Greenlee

Representative to show you other ways of beating high production costs with Greenlee Air-Feed Automatics.



FAST SET-UPS BECAUSE . . .

- ✓ Wide-open tooling area
- ✓ Interchangeable tool holders
- ✓ Easy-to-change stationary type collets

WRITE
FOR
CATALOG
A-405



GREENLEE BROS. & CO.
1891 MASON AVENUE
ROCKFORD, ILL.

For more data circle 343 on Postpaid Card

Are your lathes designed to profit from throwaway insert tools?



Real profits come from decreased tool-change downtime and increased machine speeds

You can take full advantage of the savings made possible by throwaway insert tooling — elimination of sharpening and resetting costs, and decreased tool-change downtime — if you have a modern, high-speed lathe designed for carbides and ceramics. Chances are savings in tool-replacement costs plus greater production due to higher speeds and increased rigidity will amount to thousands of dollars a year, enough to pay for the new lathes you need badly to take full profit advantage.

The use of conventional speeds with throwaway insert tools is *wasteful*. And your profits are pegged low if you're using them on 20-year-old lathes that are underpowered for high-velocity turning. With perishable-tool costs so low in comparison with the cost of operating a lathe, the only sensible thing to do is boost machine speeds . . . burn up the cutting tool faster . . . really trim the fat out of the part price.

The speed at which tool costs and machining costs are in balance is your PROFIT POINT (see example above). But to operate at the right speed you need power, precision, and rigidity in lathes used with throwaway insert tooling—advantages your company will be glad to pay for in order to save time, floor space, and cost.

In other words, why put throwaway insert tooling on a "throwaway profit" machine tool?

Example of PROFIT-POINT Turning		
Cost Item	Brazed Carbide	Throwaway Insert
Tool-change time	5 min.	2 min.
Cost per cutting edge	\$1.27	\$.25
Minimum cost tool life	40.4 min.	11 min.
Cutting speed for PROFIT-POINT turning	720 fpm 1000 rpm	990 fpm 1300 rpm
Machining time per piece	1 min.	.74 min.
Total time per piece (including nonproductive time per piece)	2 min.	1.74 min.
Machining cost per piece	\$.15	\$.11
Tool cost per piece	\$.031	\$.017
Nonproductive cost per piece	\$.15	\$.15
Pieces machined per hour	30	34
TOTAL COST PER PIECE	\$.331	\$.278

Barber-Colman's new 36-speed lathe is designed for PROFIT-POINT turning

Here's the machine that will give you precision work at the high speeds required for PROFIT-POINT turning with throwaway insert tools!

Look at the cross girth of the bed, extra-heavy cross slide, and rugged tailstock. Consider that this lathe will pull up to 25 hp through the spindle and operate at speeds up to 2000 rpm—yet you can get tool-room accuracy. And all the tool-room features, too, including: (1)

multiple-thread indexing spindle, (2) built-in thread-chasing dial, (3) 66 threads, from 2 to 120 per inch, (4) reverse lever on apron, (5) automatic micrometer stops, (6) ball-thread-chasing stop on cross-feed screw, (7) hardened and precision-ground cross-feed screw and compound screw, (8) automatic, filtered lubrication to half nuts.

There are 36 spindle speeds through the geared head and 66 feed and thread changes, selected easily through two dials on the headstock. Write for complete facts on how this new Barber-Colman precision lathe will pay for itself quickly with throwaway insert tooling.

Barber-Colman Company
114 Loomis St., Rockford, Illinois

Don't expect a day's work for a day's pay on yesterday's machine tools

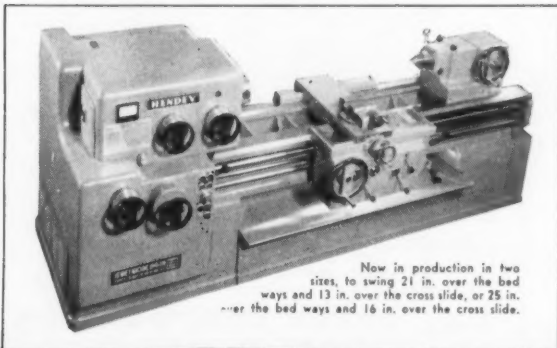


PRECISION LATHES

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November, 1958

modern machine shop 43



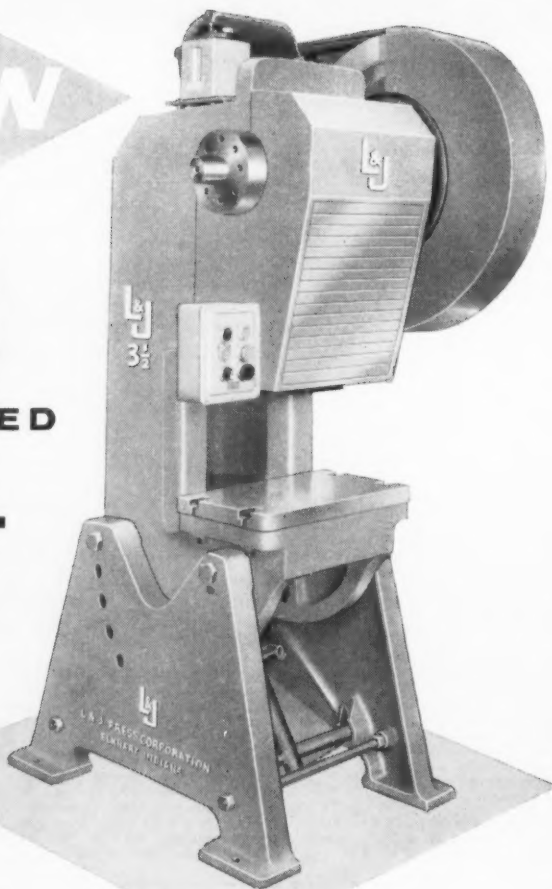
Now in production in two sizes, to swing 21 in. over the bed ways and 13 in. over the cross slide, or 25 in. over the bed ways and 16 in. over the cross slide.

NEW



HIGH SPEED

Multi-Duty Press



OPTIONAL EQUIPMENT

Oil shield. Air clutch. Left or right fly wheel mounting. Variable speed drive. Automatic feed. Automatic misfeed stop. Accurate top stop. Push button or dial speed controls. Electric speed indicator, etc.

Straight Side Punch Presses Single and Double Crank

Versatile, fast for volume production of small parts with large or progressive dies. 20 to 150 tons.

- New 27 ton press with many advantages.
- Improved frame design for greater rigidity, better accuracy and longer die life.
- Fully enclosed for extra safety and cleanliness.
- Speeds to 450 s.p.m. at 1" stroke (2½" std.).
- Efficient at all speeds—on all jobs.
- Readily adaptable to special jobs at low cost.

WRITE for complete information — 23 O.B.I. geared and non-geared presses, 14 to 90 tons.

L & J PRESS CORPORATION
STERLING AVE., ELKHART, IND.

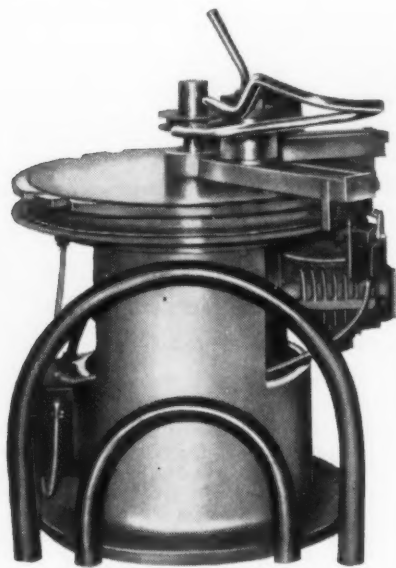
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tricky

BENDS ARE EASY WITH PEDRICK BENDERS

Complicated pipe, tube or structural metal bends are a cinch with Pedrick Production Benders—on either a production or job basis.

Show us your problem—with drawings, if possible—and we'll show you the answer. Write PEDRICK TOOL AND MACHINE CO., 3640 N. Lawrence St., Phila. 40, Pa. Dept. 5.



FREE "PEDRICK LINE" BULLETIN.
WRITE TODAY.

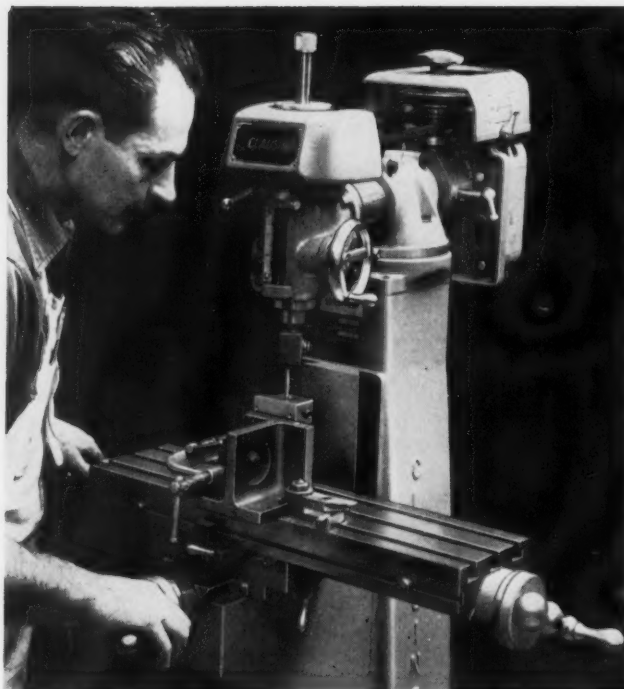
PEDRICK

production benders

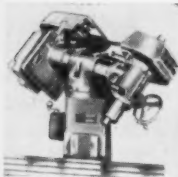
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November, 1958

modern machine shop 45



The high precision spindle and drive have 7 ball bearings . . . hardened spindle. Ground and hard chrome plated quill has full length bearing in head.



The spindle head can be swiveled in a vertical plane and set at any angle, and turret rotated in a horizontal plane making it possible to machine at all angles with one set-up.

HERE'S PROOF OF PERFORMANCE . . .

"The Clausing Vertical Miller is the best machine for the money on the market today! It is most versatile . . . and extremely accurate". — F. L. BALLENTINE, EMPIRE TOOL ENGINEERING COMPANY, INC.

VERIFIED ACCURACY — Before it leaves the factory each CLAUSING Mill must pass rigid tolerance tests such as:

1. Top of table perpendicular to column ways within .0005" in 6" travel.
2. T-slots square with cross slide dovetails within .0005".
3. Table, parallel to turret within .001".
4. Spindle square with table, front to rear, within .001" T.I.R. in 5" circle.
5. Spindle taper (internal) run out within .0002" at spindle nose.
6. Table T-slots parallel to table dovetail ways within .0005" in 8" longitudinal travel.

This report is typical of the experience of users everywhere. The CLAUSING VERTICAL MILLER is a precision machine tool designed for operations where "extremely accurate" machining is required. And, it is an outstanding producer, "most versatile, easiest to set up, get around and operate of any miller at or near its low price." Only \$850 f.o.b. factory.

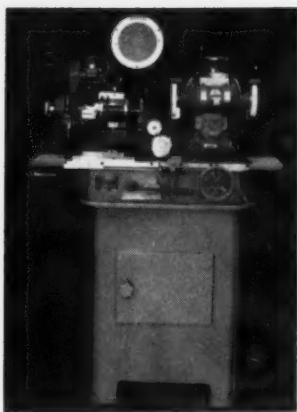
MILLS, DRILLS, BORES, REAMS, SHAPES AT ALL ANGLES . . . WITH ONE WORK SET-UP!

Write FOR FREE LITERATURE



CLAUSING DIVISION • ATLAS PRESS COMPANY
11-110 N. PITCHER ST., KALAMAZOO, MICHIGAN

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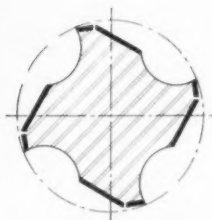


Correction!

We regret the misleading error that occurred in our ad in the October issue of *Modern Machine Shop*—the two small line illustrations comparing ordinary relief and R-O relief were transposed, which was enough to throw you if you read the body copy. This time they are right. Note how R-O relief gives you more substantial support for the cutting edge.

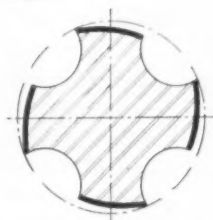
R-O LEAVES MAXIMUM METAL BEHIND THE EDGE TO SUPPORT IT

- Grinds from edge to heel,
- eliminates feathers,
- gives a keener, longer lasting edge



ORDINARY RELIEF

Because you've never used a tool ground other than like the one at the left, don't decide it's the only, the best or least expensive method of sharpening. R-O will cut perishable tool costs by giving you more cuts per grind—better cuts, too!



R-O RELIEF

Sharpen step drills, reamers, form mills, center drills, boring tools, etc. Grind flats, hexes, ellipses, cams, etc. from the solid. R-O may be the answer to a job you are struggling with.

RO
UNIVERSAL
FORM RELIEVING
FIXTURE

R-O Grinder

GRINDER DIVISION
Royal Oak Tool & Machine Co.
29800 Stephenson Highway
Royal Oak, Michigan
Please forward your R-O catalog

Firm _____
Address _____
City-State _____
Per _____

For more data circle 348 on Postpaid Card

STANDARD BROACHES *all from stock!*



Minute Man KEYWAY BROACH KIT

In one minute and for as little as one cent you can cut a keyway with this kit. For keyways from $\frac{1}{16}$ " to 1" in any bore from $\frac{1}{16}$ " to 3".



$\frac{1}{8}$ " to $\frac{3}{4}$ " squares and hex's; $\frac{1}{4}$ " to 1" round. Production Type Keyway Broaches also in stock.

The duMONT CORPORATION Greenfield, Mass.

MAIL FREE BROACH CATALOG AND PRICE LIST S describing Square Broaches, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to

Name

Company

Address

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Meetings

Important Meeting Dates

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

NOVEMBER 5-7 • Industrial Management Society, Annual Industrial Engineering and Management Clinic, Hotel Sherman, Chicago. Society headquarters: 330 S. Wells St., Chicago 6, Illinois.

NOVEMBER 5-7 • Porcelain Enamel Institute, Shop Practice Forum, University of Illinois and Urbana Lincoln Hotel, Urbana, Ill. Institute headquarters: 1145 19th St., N. W., Washington 6, D. C.

NOVEMBER 5-9 • National Tool and Die Manufacturers Association, Annual Convention, Sheraton Hotel, Philadelphia. Association headquarters: 907 Public Square Bldg., Cleveland 13, Ohio.

NOVEMBER 10-12 • Steel Founders' Society of America, Technical and Operating Conference, Carter Hotel, Cleveland. Society headquarters: 606 Terminal Tower, Cleveland 13, Ohio.

NOVEMBER 10-13 • National Electrical Manufacturers Association, Annual Meeting, Traymore Hotel, Atlantic City, N. J. Association headquarters: 155 E. 44th St., New York 17, New York.

NOVEMBER 12-14 • Society for Experimental Stress Analysis, Annual Meeting, Hotel Sheraton-Ten-Eyck, Albany, N. Y. Society headquarters: P. O. Box 168, Cambridge 39, Massachusetts.

NOVEMBER 20-21 • National Foundry Association, Annual Meeting, Drake Hotel, Chicago. Association headquarters: 53 W. Jackson Blvd., Chicago 4, Illinois.

NOVEMBER 30-DECEMBER 5 • American Society of Mechanical Engineers, Annual Meeting, Statler and Sheraton McAlpin Hotels, New York. Society headquarters: 29 W. 39th St., New York 18, New York.

HY-PRO tap engineering tells you which tap where for lowest cost per hole

HY-PRO tap engineering service provides prompt answers
... the *right* answers that mean steady savings in tap
expense, in time loss on the line, in reduced parts spoilage.

in plastics



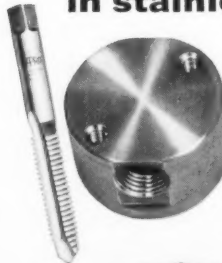
Abrasive composition of most hard plastics requires Hy-Pro's multi-fluted design, .0025 oversize, with the exclusive Hy-Pro "Hardernell" finish for maximum wear resistance and free-cutting.

in die castings



Relative softness of alloys used causes tendency to close in and bind the tap. Hy-Pro's 2 flute spiral point oversize design meets these conditions—provides free-tapping, clean threads.

in stainless steel



Hy-Pro spiral point design provides high-hook angle for most efficient cutting of this metal, and maximum tap strength. Ferrox surface treatment counteracts chip welding.

in aluminum



Hy-Pro's spiral (1) flute tap lifts chips out, gives best results in blind holes. Hy-Pro's spiral point design (2) is recommended for through holes.

Chrome plate or nitride surface treatment resists abrasive effect of most aluminum alloys.



The Tap Engineering Specialists

ASK FOR STOCK LIST OF SPECIAL TAPS
AVAILABLE FOR IMMEDIATE DELIVERY

CALL YOUR LOCAL **HY-PRO DISTRIBUTOR** FOR STANDARD TAPS FROM STOCK


For more data circle 350 on Postpaid Card

What's your tapping problem?

It costs nothing to consult Hy-Pro Specialists, and records prove that in 8 out of 10 cases, their advice will pay steady dividends in savings. Write Dept. G.

HY-PRO TOOL COMPANY
DIVISION OF CONTINENTAL SCREW CO.
NEW BEDFORD, MASS., U. S. A.





He's equipping this machine with the "Touch of Gold"

Grinding is always a profit-producing step in metal working. That's why the grinding wheel itself is so important — and why Norton world leadership in grinding is important to you when you specify grinding wheels.

Because a Norton wheel, contacting the work in process, is always adding the "Touch of Gold" . . . creating value and

usefulness through improving the fit and finish of the product. The right wheel for each job is the key to having each job done right . . . which is the real secret of profitable production. And Norton stocks more than 200,000 types and sizes of grinding wheels to make your "Touch of Gold" quickly available. Plants and distributors all around the world.

NORTON COMPANY, General Offices,
Worcester 6, Massachusetts.



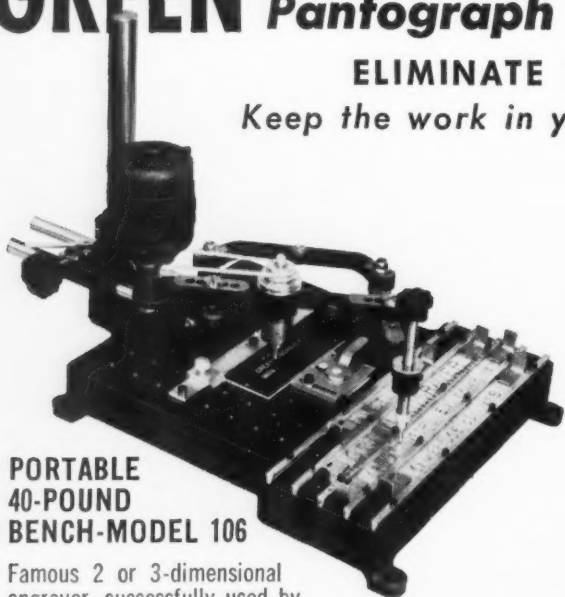
A B R A S I V E S

Making better products...to make your products better

GREEN *Pantograph Engravers*

ELIMINATE DELAYS!

Keep the work in your own plant.



PORTABLE 40-POUND BENCH-MODEL 106

Famous 2 or 3-dimensional engraver, successfully used by thousands, features 5 positive, accurate pantograph ratios. Versatile ball bearing spindle has three speeds up to 14,000 rpm; height of pantograph and position of cutter are continuously adjustable; one copy carrier (supplied) accepts all standard master type sizes.

The Model 106 has proven incomparable for speed and accuracy . . . yet reasonably priced.

Cutter grinders, rotary tables, master letters, compound slides, name plates and all required accessories. For complete information, write to



MODEL D2 HEAVY-DUTY 2-DIMENSIONAL

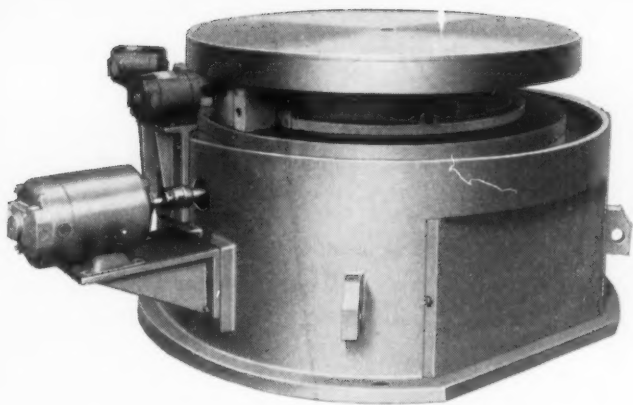
- 575 pounds — rigid, sturdy, precise
- Vertical adjustment of copy table automatic with Pantograph
- Unobstructed on three sides to take large work
- Micrometer adjustment for depth of cut
- Ball-bearing construction throughout — super-precision ball bearing spindle
- Spindle speeds up to 26,000 rpm for engraving or machining modern materials
- Ratios 2 to 1 to infinity — master copy area 26" x 10"
- Vertical range over 10"



**GREEN
INSTRUMENT
COMPANY, INC.**

392 PUTNAM AVENUE, CAMBRIDGE 39, MASS.

For more data circle 353 on Postpaid Card



drill varied hole patterns without changing set-up

If your drilling, tapping, or milling jobs require even, uneven, or skip indexing, this new Electrodex table will give you more flexibility than ever.

Set up your work piece just once on this table, and you can drill many different hole patterns. Changeover from one index pattern to another is fast. You can do it mechanically—with index rings or inexpensive templates—

or by push-button electrical counting.

Eight-channel numerical tape control is available. You get indexing accuracy to $\pm .001$ " at a 45" diameter. And you can choose your table size from 30", 45", 60", and 80" diameters.

Bulletin 258 gives complete details.

Avey Division, The Motch & Merryweather Machinery Co., Box No. 1264, Cincinnati 1, Ohio.



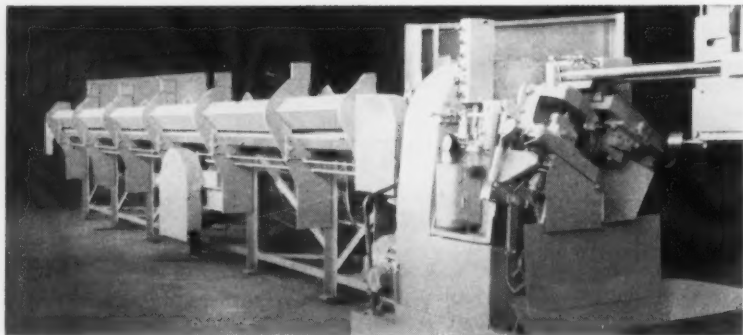
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Why Don't You **GO MODERN?**

"Do it yourself" is sometimes rough,
But it keeps the lady trim and lean—
Provided she works hard enough
With a rusty cutting-off machine.

Use the Modern Cutting-off Machine



The chances are a woman would put on weight if she were operating the modern automatic Cutting-off Machine and Automatic Stock Feeder. You simply fill the feeder—with random lengths of tubing with diameters up to 8", or bar stock. Then you push the button and take a coffee-break. The operation is entirely automatic from then on.

This machine is fast—accurate—economical.

Write for catalog and full information.

MODERN MACHINE TOOL CO.

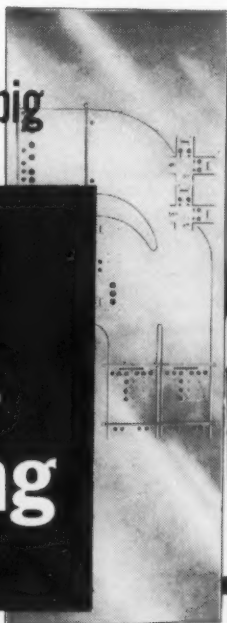
**2005 LOSEY AVENUE
Jackson, Michigan**

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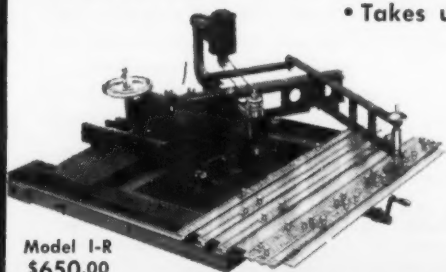
Now — NO plate too small — 213B

NO panel too big

**NO
size limits
on engraving**



ENGRAVES 18"x6" RECTANGLE IN ONE SET-UP



Model I-R
\$650.00

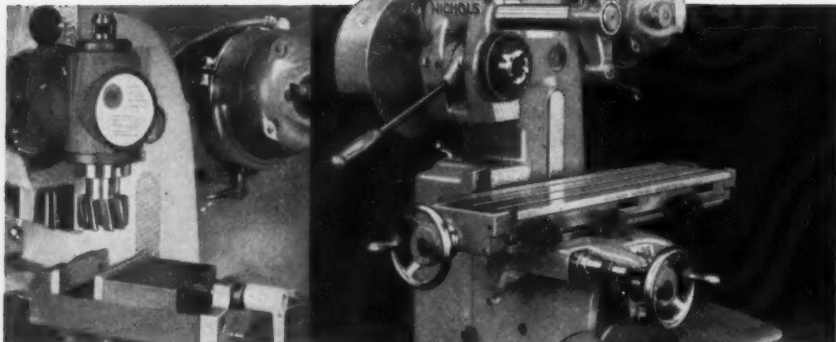
• Takes up only 2 feet of bench space

- Engraving chassis can be detached from base and placed directly on work-piece of any dimension
- Self-centering workholder cuts down set-up time
- Heavy duty cutter spindle

Send for
booklet FR-2

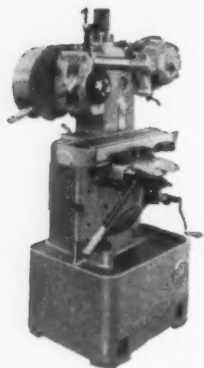
new hermes ENGRAVING MACHINE CORP.
13-19 University Place, New York 3, N.Y.

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STURDY NICHOLS VERTICAL HEAD
... has No. 40 Taper Spindle
NICHOLS SWIVEL VISE is a true precision unit equipped with verniers ... only two of many available accessories.

NICHOLS TOOL ROOM MILLER



STANDARD MODEL—A precise, versatile Hand Miller with Rise and Fall spindle. Table size 6½" x 21".

ACCURACY—SENSITIVITY—VERSATILITY

Gives the tool room what it demands—a compact, rugged miller with extreme accuracy and utmost flexibility. The Nichols TOOL ROOM MILLER is arranged for sensitive hand screw feed, has generous table surface—8½" x 30" with 19" longitudinal travel. Precision feed screws have oversize, easy reading micrometer dials. Large hand wheels provide element of "feel" so important in precision milling. Rise-and-Fall Spindle simplifies set-ups. Lever table feed, furnished in addition to screw feed, increases usefulness. Selective speed ranges up to 5000 RPM.

2 educational 16 mm sound color films available for free showing—send for descriptive letter and reservation form.

MANUFACTURED BY W. H. NICHOLS COMPANY
THE ROBERT E. MORRIS COMPANY

REM SALES DIVISION

5004 FARMINGTON AVENUE • WEST HARTFORD 7, CONN.

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NATIONAL DISTRIBUTORS

Never before a honing machine like this new Model "AM" by Superior . . .

A new equipment that will help all plants shorten honing time, achieve a better finish on most types of metals, hard or soft, and realize much longer stone life.

Combines the rugged dependability and economical precision and speed which make it ideal for production runs, tool room work and salvage operations.

The only single machine which affords infinitely variable speeds of from 250 to 1400 rpm. Sealed ball bearing spindle. Tachometer permits accurate speed setting. Dial indicator available. Large disc clutch and disc brake.

An exclusive feature is the 14-gallon capacity coolant tank which is removable for easy cleaning. Coolant tank, drive, and $\frac{1}{2}$ H.P., 110-



volt, 60 cy., single phase motor completely enclosed in heavy steel base which has louvered cover to provide ample ventilation.

Employs standard V-belt drive and provides automatic tensioning. The filter tray has three settling baffles and bur-lap filter. Overall size only 48" high, 28" wide and 36" deep. The top is formed into a convenient tray.

Universal adjustment of light. All on-off switches are mounted on the front of the machine for maximum convenience.

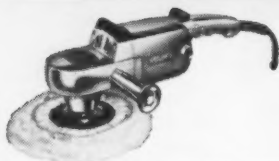
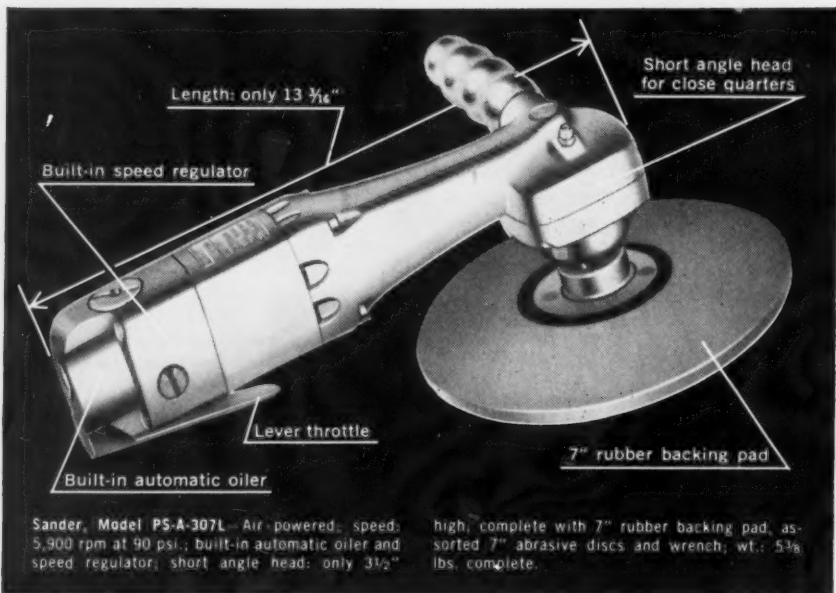
"You get so much more when you get Superior Honing Machines"

Send today to Honing Headquarters for literature and prices.

SUPERIOR HONE CORPORATION
1615 ELRENO STREET **ELKHART, INDIANA**

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POWER to boost job efficiency with REMINGTON tools



Polisher, Model 47P—8" bonnet; free speed: 1400 rpm; load speed: 840 rpm; 115 or 230 volts; heavy-duty ball bearings; wt.: 12 lbs.; with eye-bolt for reel suspension.



Reversible Screwdriver, Model PSDR-204P—Air-powered; reverses with a flip of a lever; adjustable clutch sets screws within 5% of set torque; speed: 1500 rpm at 90 psi.

Remington delivers mobility and all the power you need to help cut production costs. With Remington you can standardize on the industry's widest selection of power tools—air, electric or gasoline-driven—with parts and service from one source. For free booklet describing the complete line of Remington Contractor and Industrial Tools mail Readers' Service card or see your local Remington distributor.

Remington

Remington Arms Company, Inc.,
Bridgeport 2, Connecticut.

In Canada: 36 Queen Elizabeth Blvd., Toronto, Ontario.



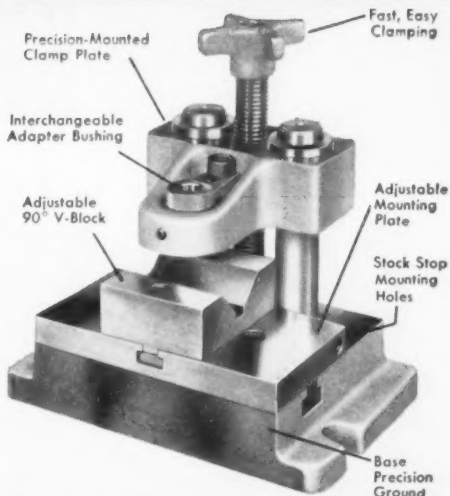
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REPCO *Time-Saving Tools*

ADJUSTABLE V-BLOCK DRILL JIG

**Saves Set-Up Time—
Increases Output**

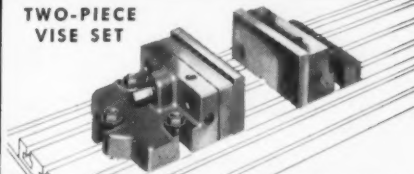
Here is a versatile and accurate V-Block that makes center and off-center drilling, tapping, and reaming easy and precise. Four-way V-block adjustment simplifies handling a wide range of work. Fast, easy positioning and clamping speed production. A centering locator plug and T-slots in the mounting surface plates assure fast, easy, on-center adjustment. Drill capacity #80 to $\frac{1}{8}$ " diameter. Handles stock from $\frac{1}{4}$ " to 2" diameter.



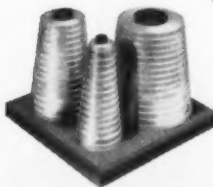
TRUE-CENTER ADJUSTABLE TOOL HOLDER

The REPCO Adjustable Holder is a precision-built tool, having two-piece construction which provides fast adjustment of the main body to compensate for as much as $\frac{1}{32}$ " machine misalignment. Cuts down on tool wear, breakage, and scrap.

TWO-PIECE VISE SET



Save time with this versatile 2-Piece Machine Vise Set. Use as general-purpose vise, angle-block, or separate clamping device. Opening limited only to length of machine base. Light, accurate, rigid. Two sizes: 6" and 8".

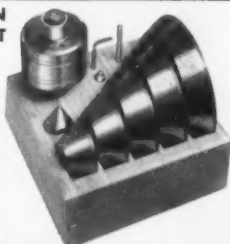


CHUCK JAW TRUING-RING SET

This Ring Set saves time, cuts cost of boring jaws. With correct diameter rings at hand, you gain hours of productive time. Plated rings range from 1" to 4" by $\frac{1}{16}$ " increments. Handy peg-type rack keeps rings in place.

COMBINATION LIVE-CENTER SET

Heavy-duty live center plus six interchangeable adapters, ranging from a point to $\frac{6}{16}$ " dia. bell. Saves costly set-up and machining time necessary to make large-diameter centers. Straight and various taper shanks available.

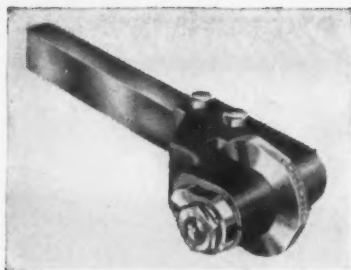


Write for complete information—Exclusive agent territories open.

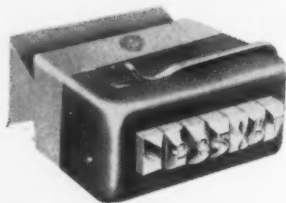
ROCKFORD ENGINEERED PRODUCTS CO.

23rd Ave. & 20th St., Rockford, Illinois

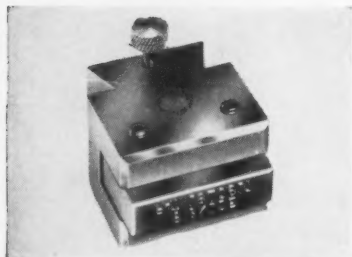
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MARKING DIES



Integrate your marking operations by utilizing present equipment and incorporating a Matthews' Marking Device. Many production operations are easily adapted to marking simply through the addition of a Tool Post Holder and Roller Die. Matthews' Press Style Holders and interchangeable type, too, are easily designed to fit existing press equipment. Write or call today for additional information.



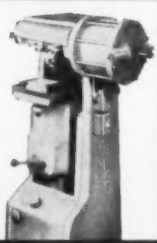
LOW COST VERSATILITY

EASY INSTALLATION

MARKING UNIFORMITY



If present production methods do not include suitable equipment for marking, Matthews' has a complete line of General and Special Purpose Machines. Send for Bulletin GPF-200.



JAS. H. MATTHEWS & CO.

3944 FORBES STREET, PITTSBURGH 13, PA.

OFFICES IN PRINCIPAL CITIES

WRITE, CALL, OR TWX PG 424

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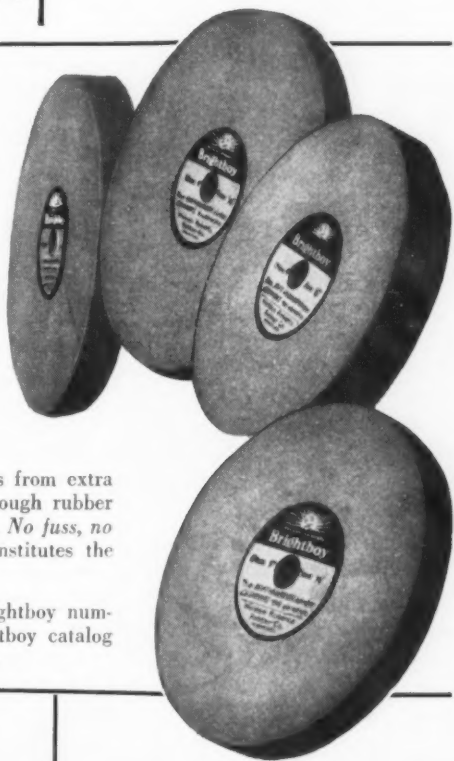
IMPROVE YOUR PRODUCT AT LOWER COST!

Faced with a
"Profit Squeeze"?
Confronted with
Price Competition?

Whatever your objectives, investigate cost saving, rubber cushioned Brightboy for a new concept of wider abrasive applications. Brightboy's unique abrasive action (abrasive and rubber, working simultaneously) is saving time, reducing work operations for many, widely varied industries.

Brightboy is a STOCK line, readily available. Grades and textures JOB MATCHED to your requirements. Wheels, sticks, rods and blocks for machine and manual operations. A wide selection in Silicon Carbide and Aluminum Oxide grains. Each in grades from extra fine to extra coarse, in soft, firm and tough rubber binders. The compound is in the rubber. *No fuss, no muss.* A Brightboy finish frequently constitutes the final polish.

Ask your dealer to recommend the Brightboy numbers for your needs, and for the Brightboy catalog listing applications and machine speeds.



BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
95 North 13th Street, Newark 7, N. J.
*America's Pioneer Manufacturer of
Rubber-Bonded Abrasives*

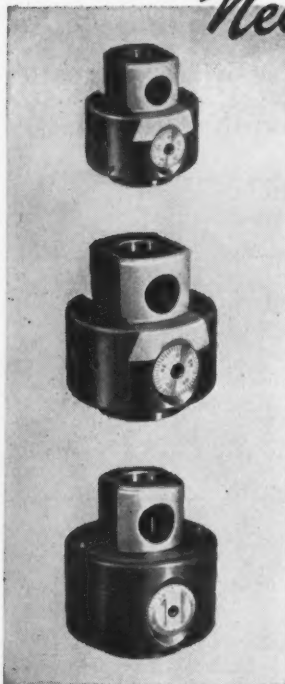
WRITE FOR FREE SAMPLE
BRIGHTBOY HAND PIECE

and

"Notes From
The Brightboy Service Engineer"
describing
Brightboy applications and uses

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New from Criterion!



3 NEW BORING HEADS WITH THESE OUTSTANDING FEATURES

Round-body design
Cross-hole for greater range
Short - compact construction
Sizes — #102 has 2" diameter
 #103 has 3" diameter
Boring range — 1/16" to 8" and larger

NEW 3" DIAMETER MODEL #203 INCLUDES THESE ADDITIONAL FEATURES

Protective cap houses all moving parts
Friction lock dial face permits return
to zero setting.

THESE NEW HEADS TAKE 1/2" or 3/4" SHANK BORING TOOLS AND BORING BARS

RUST-RESISTING BLACK AND SATIN-CHROME FINISH

Offset range — 1/2" in 2" dia. model
 3/4" in 3" dia. model
Complete line of high-speed and carbide
boring tools to fit all Criterion Heads
carried in stock.



CRITERION BORING HEADS are better because they
combine utility with simplicity of design — see
sketch to the right for one of many features.



Consult your Criterion Dealer or write for free literature.
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**INCREASES
PRODUCTION...**

LOWERS COSTS...

**PAYS FOR ITSELF
QUICKLY...**

The ROUSE HAND MILLER is a widely used, inexpensive, high speed, ball bearing, motor driven machine for handling light cuts in brass, aluminum, steel, plastics, and other materials—fast, accurately, and at very low cost. Only \$114.00*

Fixtures (illustrated) extra.

Motor equipment:— $\frac{1}{4}$ H.P. 110 Volt AC 60 cycle, single phase, swivel motor mount and light—\$42.00*

*All prices FOB Chicago.



- ★ **MILLS SMALL PARTS MUCH FASTER.**
- ★ **DRASTICALLY CUTS YOUR INVESTMENT IN EQUIPMENT.** Replaces expensive production machinery—or releases it for other jobs.
- ★ **INEXPERIENCED HELP CAN OPERATE IT.** Safe, simple, fool-proof operation.
- ★ **NO MORE COSTLY SET-UP TIME.** \$114.00* price so low that it pays to keep one or more Hand Millers always set-up for special operations.
- ★ **YOU GET A BETTER PRODUCT**—the result of ABSOLUTE ACCURACY.
- ★ **A LOSS BECOMES A PROFIT** when marginal pieces are finished on the Hand Miller instead of on high cost equipment.
- ★ **VERY LOW MAINTENANCE.**
- ★ **USED REGULARLY IN 1163 MANUFACTURING PLANTS** (some of which use as many as 30 machines)—yet on the market a scant few years.
- ★ **UNIQUE—VERSATILE.** Nothing else like it. One or several machines can be the answer to some of your production problems.

**Write today
for further
information.**

H. B. ROUSE & COMPANY

2214 N. WAYNE AVE., CHICAGO 14
50 YEARS OF SERVICE TO INDUSTRY

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Allison-Campbell

ABRASIVE CUTTING KNOW-HOW

ACCO
for Better
Values

WHEEL EDGES TELL THE STORY!

NORMAL • The right abrasive cutting wheel, properly applied, produces edges like these:



Slightly rounded edge is a sign of the right wheel properly applied to the cutting of solid bar stock up to 12 inches square. You'll get fast cutting and long wheel-life with the right abrasive cutting wheel.



A wheel which retains its square edge is well-suited to cutting both—solids, and structurals or tubing of medium wall thickness. A good general-purpose wheel is required for these mixed cutting operations.



This edge is slightly concave. It should appear this way when you've used the right wheel to cut light tubing or other thin wall sections. ALLISON wheels designed for this application make burr negligible.

ABNORMAL • The wrong wheel, or improper application, produces edges like these:



A slightly pointed edge means a wheel mismatched to the cutting job. A wheel which looks like this is too hard, doesn't break down uniformly. The tapering effect can produce wheel binding and breakage, and can burn the cut.



A "chisel" edge shows uneven wear, faster breakdown of the wheel on one side than on the other. It's the result of improper application of coolant in wet cutting. The result—shorter wheel life, and crooked cuts.



When the abrasive grain on the wheel edge wears smooth without being torn out, the edge becomes "glazed," and the wheel loses its cutting efficiency. This condition is easily avoided by proper wheel application.

Abrasive Cutting Can Give You **CLEANER** Cuts—Faster

Cutting speeds of a few seconds per square inch, on almost any material, mean substantial time savings. Even titanium can be cut quickly and economically with the right abrasive cutting machine and wheel.

Fine finish obtained from abrasive cutting avoids burn, minimizes burr, and reduces or eliminates additional finishing operations.

Accuracy of CAMPBELL machines permits cutting within the closest tolerances, reduces rejects and scrap loss.

A complete selection of machines and wheels for any cut-off application is offered by ALLISON-CAMPBELL. Four types of CAMPBELL machines—chop stroke, oscillating, horizontal, and rotary—in capacities from the smallest stock to 14" rounds

... billets up to 12" square ... plate up to 6" thick and 20 ft. long. ALLISON wheels—more than 150 different specifications—rubber or resinoid bond—3" to 34" diameters—.006" to 3/16" thick.

Application help is available from your ALLISON-CAMPBELL Field Engineer. His know-how is your assurance of the efficient, accurate, and economical cutting you can expect from modern abrasive cutting techniques. Call on him for expert advice.

WRITE FOR NEW BULLETIN

ALLISON-CAMPBELL Division has a modern, fully equipped Demonstration Laboratory in which your own cutting problems can be analyzed. Write for a copy of DH-20, a new bulletin describing these services. Details on ALLISON Abrasive Cutting Wheels and CAMPBELL Machines are also available.

ALLISON-CAMPBELL DIVISION AMERICAN CHAIN & CABLE

931 Connecticut Avenue, Bridgeport 2, Conn.
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Finish obtained in machining REX M-2-S eliminates the need for finish grinding this 4" x 4" unground double thread cutting hob.

Hobs seldom need finish grinding when made of low cost REX M-2-S

This is the actual finish obtained—without costly finish grinding—with REX M-2-S,[®] Crucible's *sulfur-bearing*, tungsten-molybdenum type high speed steel. The chemistry of this resulturized steel readily provides the machinability needed for the final, critical "backing-off" operation in making hobs. It doesn't tend to tear or produce rough finishes—as non-sulfur-bearing steels of this type so often do.

REX M-2-S costs about 30% less than T-1 type, too, because it's lower priced per pound, and provides 5.4% more linear feet per pound.

Crucible REX M-2-S is also equal in red hardness to the T-1 type, and even

more resistant to abrasion. It's also tougher than any other tungsten type high speed steels, and hardenable over a wider range than any other molybdenum high speed steels.

Qualities like these make REX M-2-S extremely suitable (and economical) for broaches, chasers, lathe tools, reamers, taps and hobs as well as other tools normally requiring high speed steel.

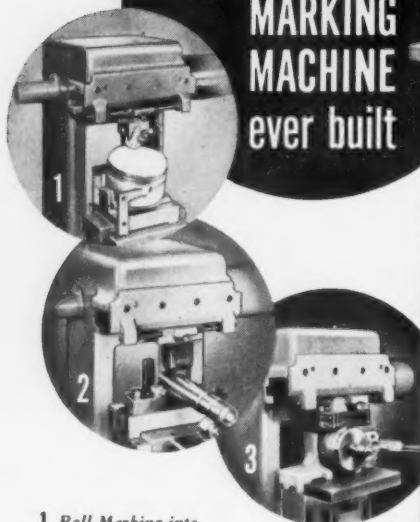
For further information, just ask for details on REX M-2-S—or all the Crucible high speed steels today. Write: *Crucible Steel Company of America, Dept. TK11, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE STEEL COMPANY OF AMERICA

Canadian Distributor — Railway & Power Engineering Corp., Ltd.
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THE MOST

Versatile
**MARKING
MACHINE**
ever built



- 1 Roll-Marking into
Surface of Piston
- 2 Serial Numbering into
Metal Shaft
- 3 Permanent Marking
and Graduating into
Metal Collar



Model 50P1

ROLL-O-MARK

**Multi-Purpose
All-Pneumatic**

MARKING MACHINE

Whatever your needs for metal marking, Noblewest makes the machines, marking dies, and work-holding fixtures for doing the complete job faster, better, at lower cost. And remember, Noblewest Roll-Marking is *permanent* marking—good for the life of your product. Write

NOBLE & WESTBROOK MANUFACTURING COMPANY
25 Westbrook Street, East Hartford 8, Conn.

MARK IT BEST WITH

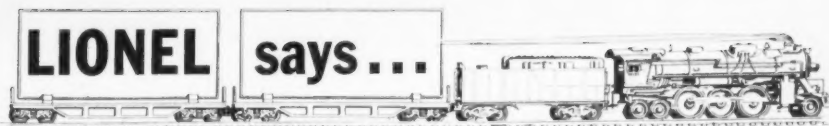


NOBLEWEST

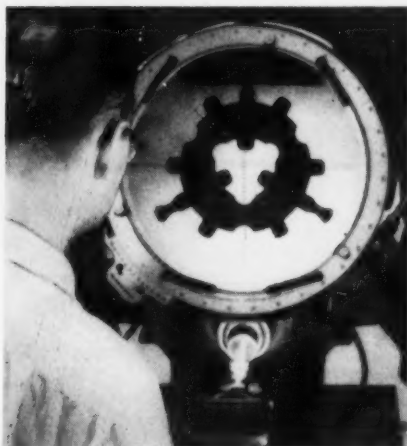
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NUMBERING
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A few desirable territories open to qualified representatives

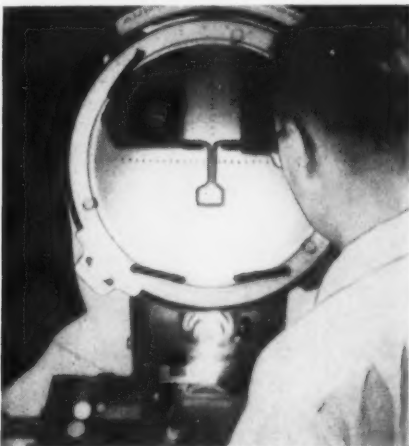
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"Jones & Lamson Comparators help us make difficult inspection jobs easy. Delicate, intricately-shaped parts are inspected speedily and accurately. Our savings in time and money are substantial."



*checking the critical dimensions
of an armature commutator*



*new "T" rail is one of many parts
held to very close tolerances*

Many manufacturers of mass-produced precision parts and components face these demanding inspection requirements: — *Speed*, to keep pace with production; *Extreme accuracy*, for tolerances as close as .0001"; *Flexibility*, because of variety of parts, and different types of inspections and measurements needed; *Reliability*, for sure quality control; *Ease of operation and maintenance*, for steady day-in, day-out performance.

THE LIONEL CORPORATION is but one of many, many firms that have found Jones & Lamson Optical Comparators fill all these requirements.

J&L Optical Comparators are available in a range of 13 different models, both bench and pedestal types. Write today for our new Comparator Catalog GL5803.

"World's oldest and largest builder of precision optical comparators"



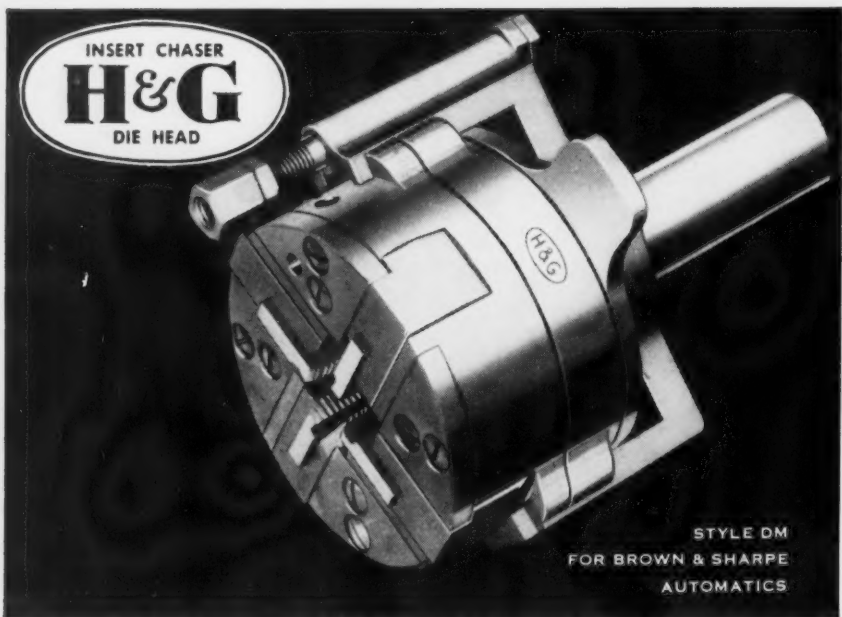
JONES & LAMSON

JONES & LAMSON MACHINE COMPANY, Dept. 710, 521 Clinton Street, Springfield, Vermont



MODEL PC-14

For more data circle 368 on Postpaid Card



STYLE AND SIZES FOR ALL MACHINES ON WHICH THREADS ARE CUT

On Brown and Sharpe, and other automatics

INSERT CHASERS SAVE UP TO 33%

Insert chasers are like safety razor blades: they cost so little that you can throw them away when dull. Or, for utmost economy, you can resharpen them over and over again. Only a flash grind is required. For less than \$50 you get a dozen sets of $\frac{3}{4}$ —16 insert chasers, each set ground ready to go. You will be amazed at the quantity of threads they will cut, even to Class 3 specifications, with a minimum of downtime.

free: "Unified and American Screw Thread Digest"

THE EASTERN MACHINE SCREW CORPORATION

40-50 BARCLAY ST.

NEW HAVEN, CONN.

For more data circle 369 on Postpaid Card

68 modern machine shop

November, 1958

Exce
Ex-C
borin
cross
differ
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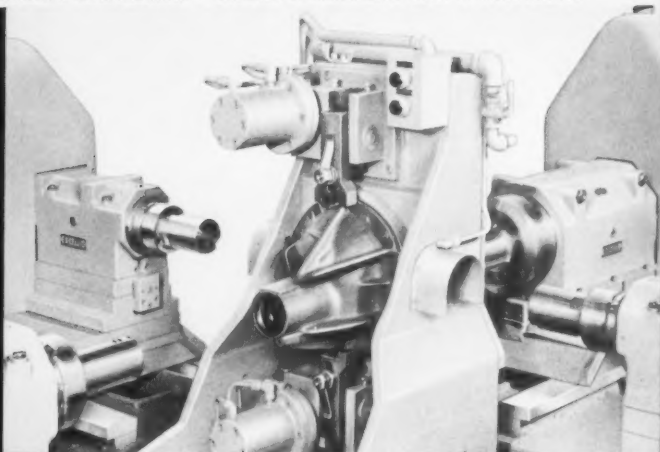
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Two E
Bor-D
extrem
limits

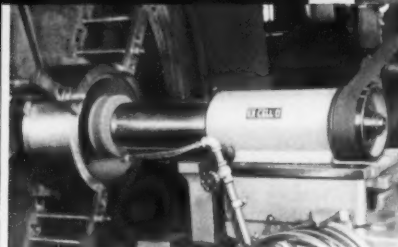
EX-CELL-O Precision Production News

COST-CUTTING IDEAS FROM EX-CELL-O CORPORATION — DEVOTED TO MINIMIZING COST OF PRODUCTION

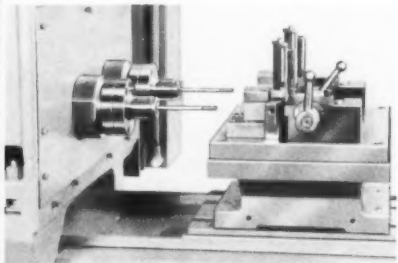
Exact limits are held by Ex-Cell-O Precision Spindles boring pinion bearings and cross hole in this automotive differential carrier. Pre-loaded ball bearing construction of Ex-Cell-O Spindles plus sealed lubrication insure long life and low maintenance.



SB 42A



Internal grinder uses belt-driven spindle to grind 10" I.D. to closest tolerances. Belt-driven Ex-Cell-O Precision Spindles are available in a full range of speeds up to 25,000 rpm.



Two Ex-Cell-O Precision Spindles are used in this Bor-Drilling setup to drill jet engine blades with extreme accuracy. Ex-Cell-O Spindles hold critical limits in either ferrous or non-ferrous metals.

Do More Jobs— More Accurately

Standard Ex-Cell-O Precision Boring and Grinding Spindles cut costs in precision production

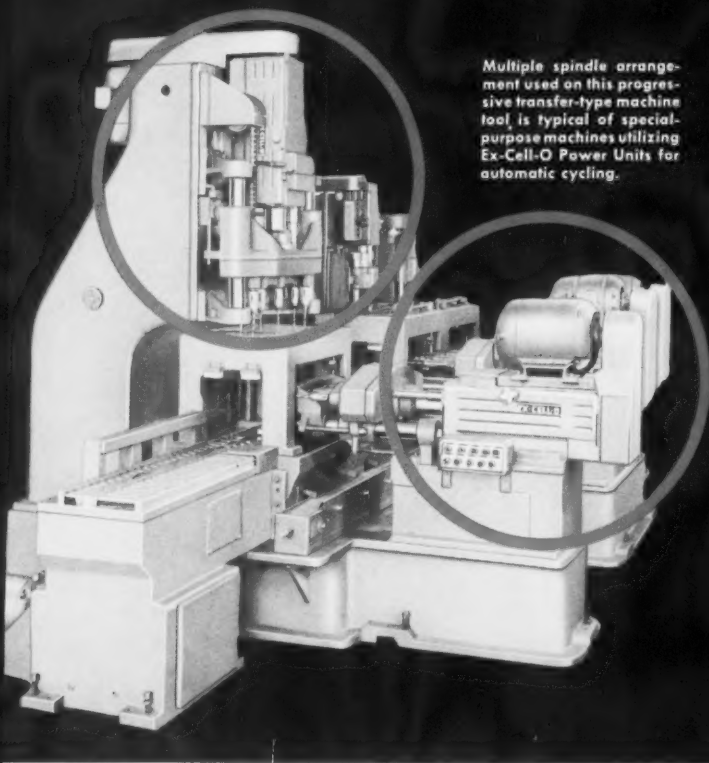
Installed as original equipment or as replacement components, standard Ex-Cell-O Precision Spindles put job-engineered efficiency into every job—surface grinding, I.D. grinding, precision boring and other applications.

Whatever the type—belt driven, air driven or motorized, designed for standard current or high frequency applications—Ex-Cell-O Spindles have earned an enviable reputation throughout the world for precision and versatility, for long-lasting operation, and for production savings.

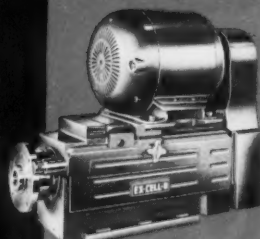
Pre-loaded ball bearing construction, absence of vibration and chatter and low maintenance make Ex-Cell-O Spindles first choice for close-tolerance, fine-finish work. Spindles also are available with heavy duty bearings for roughing and semifinishing operations.

Your local Ex-Cell-O Representative can give you all the details, or write direct.

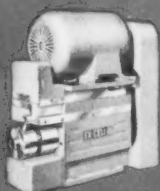
3 MORE COST-CUTTING IDEAS



Multiple spindle arrangement used on this progressive transfer-type machine tool is typical of special-purpose machines utilizing Ex-Cell-O Power Units for automatic cycling.



STYLE 26-A HYDRAULIC POWER UNIT



STYLE 33 QUILL-TYPE HYDRAULIC POWER UNIT



STYLE 30 HYDRAULIC POWER UNIT

58-428

POWER

for Changing Production Needs

EX-CELL-O QUILL-TYPE HYDRAULIC POWER UNITS CAN BE USED OVER AND OVER AGAIN, PUTTING POWER WHERE YOU NEED IT, WHEN YOU NEED IT

Ex-Cell-O Hydraulic Power Units lower manufacturing costs even on short and medium runs by performing a variety of jobs—adapting quickly to your changing production requirements.

Used to actuate single tools or multiple spindle heads for drilling, counterboring, facing, reaming and other operations, they are designed as a compact "power package" to permit close center distances when used in-line or when rearranged

and positioned radially around a fixture.

Suited to many applications, including special machines with automatic cycling, Ex-Cell-O Power Units are self-lubricated, easily installed, and they're built with famous Ex-Cell-O precision for trouble-free, long-lasting service.

Call your local Ex-Cell-O Representative or write Ex-Cell-O, Detroit, for details on the full line of Hydraulic Power Units.

This is cost-cutting— with CTW Carbide Broaches

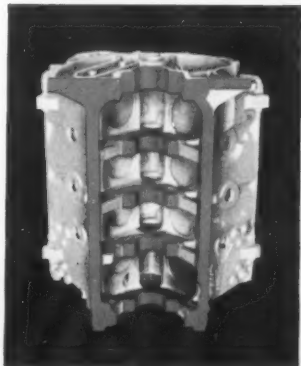
Continental Broaches increase output and reduce downtime in automobile engine block production

Greater production with less downtime are just two of the important reasons why a large automobile manufacturer uses Continental tooling for broaching of pan rail, half bores, bearing locks and parting faces of V-8 engine blocks.

Removing a maximum $\frac{3}{16}$ " stock in a single pass, this five-section, combination half-round and face broach uses carbide-tipped tool bits and broach inserts to semifinish and finish 20,000 to 22,000 cast-iron blocks between tool resharping.

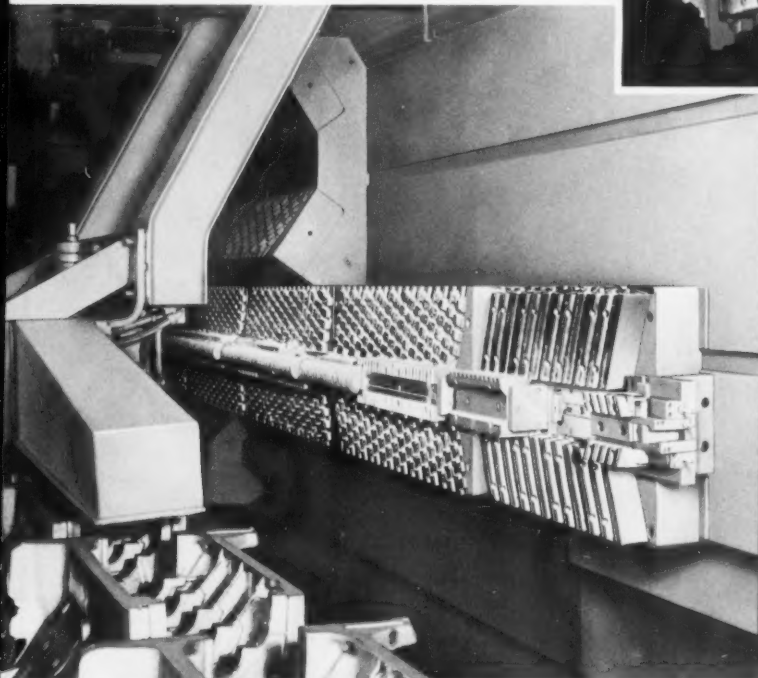
This automotive operation proves again why the production savings made possible by Continental tooling makes the "best cost less" than ordinary broaches.

58-42C



Above: In a single pass, multiple surfaces of this cast-iron engine block are semifinished and finished. Maximum stock removal is $\frac{3}{16}$ ".

Left: Continental Broaches used in this horizontal surface broach machine are made up of five sections combining half-round and facing broaches. Tool bits and broach inserts are 100% carbide-tipped.



CONTINENTAL TOOL WORKS division of EX-CELL-O CORPORATION



58-420

Make the scrap-pile test!

Start using Ex-Cell-O Drill Jig Bushings today—then watch how worn-out bushings disappear from your scrap-pile!

The reason is simple: Ex-Cell-O Drill Jig Bushings last longer because they're made better!

The answer lies in the chrome-alloy bearing steel used in Ex-Cell-O Bushings; in up-to-date automatic heat treating methods; in hole hardness quality-controlled to uniform 62-64 Rockwell "C"; and in Ex-Cell-O's own high standards for precision-ground finish inside, outside and under the head for perfect seating.

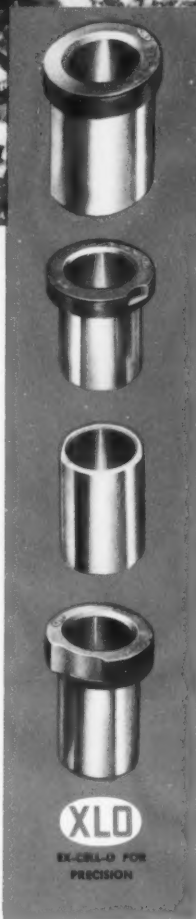
All this—plus immediate delivery to your plant from the large Drill Jig Bushing inventories Ex-Cell-O maintains at key points throughout the country.

You get fast service on special sizes, too, because Ex-Cell-O stocks many semifinished bushings in addition to the more than 10,000 standard sizes always on hand.

For "same-day" shipment, order from Ex-Cell-O Corporation at Detroit, New York, Cincinnati, Downey, Calif., or London, Canada. Call your local Ex-Cell-O Representative or write direct for an Ex-Cell-O Drill Jig Bushing catalog today.

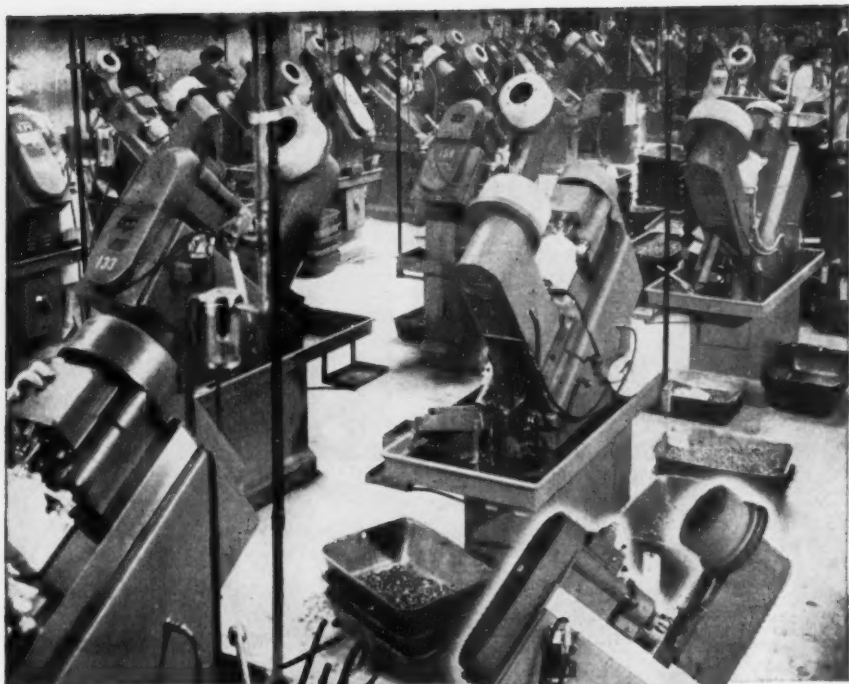
EX-CELL-O
CORPORATION
DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE
TOOLS • GRINDING AND BORING SPINDLES
CUTTING TOOLS • TORQUE ACTUATORS
RAILROAD PINS AND BUSHINGS • DRILL JIG
BUSHINGS • AIRCRAFT AND MISCELLANEOUS
PRODUCTION PARTS • DAIRY EQUIPMENT



XLO

EX-CELL-O FOR
PRECISION

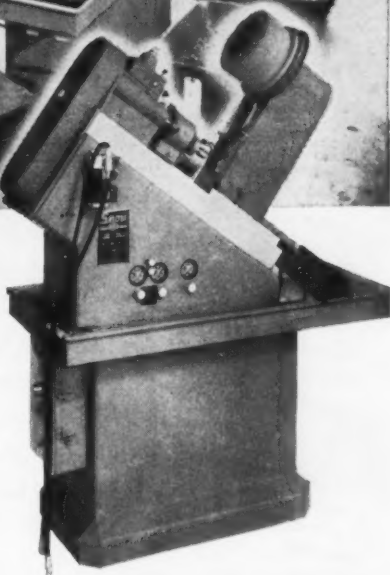


Automatic NUT TAPPING MACHINES

This installation at *Shakeproof, Division of Illinois Tool Works, Elgin, Illinois*, is an illustration of productivity—with precision.

Simplicity of set-up and lower operational costs can make your Nut Tapping Department one of the most efficient and profitable in your plant. Submit samples and prints for a comparison with your present method.

VERTICAL DRILLING MACHINES
 VERTICAL TAPPING MACHINES
 VERTICAL THREADING MACHINES
 TWO SPINDLE MACHINES
 ANGULAR MACHINES
 NUT TAPPING MACHINES
 HORIZONTAL MACHINES
 DRILLING AND TAPPING UNITS
 AUTOMATIC JIGS AND FIXTURES
 DRILL PRESS TAP HEADS



SNOW

MANUFACTURING COMPANY

435 EASTERN AVENUE, BELLWOOD, ILL.

(Suburb of Chicago)

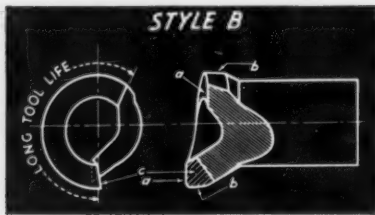
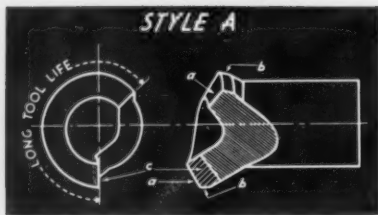
For more data circle 371 on Postpaid Card

November, 1958

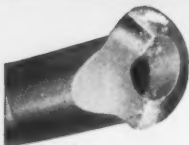
modern machine shop 69

BOKUM BORING TOOLS

are *Designed* for BORING



Combined helical (a) and radial (b) backed-off cutting form permits resharpener on only one face (c).



STYLE A
for general
boring



STYLE B
for bottoming
and facing



STYLE C
for internal
threading

Design is based on a mathematical formula which guarantees correct cutting and clearance angles anywhere around the periphery of cutting head—maintained uniformly within limits of \pm few minutes of 1° .

Bokum tools are available in 3 cutting materials: (1) super high speed steel, Cat. 1139-6; (2) carbide tipped, Cat. 398; (3) solid carbide, Cat. 948.

In range of sizes to bore holes from $1/16"$ dia. up.

To extend further the already long life of Bokum Tools, we recommend the Resharpener Fixture, Cat. AB1 and AB412. Tool holders, vertical adjustment and fixed position, Cat. 483. Write Dept. B

Because Bokum Boring Tools are designed, they are uniform and remain uniform.



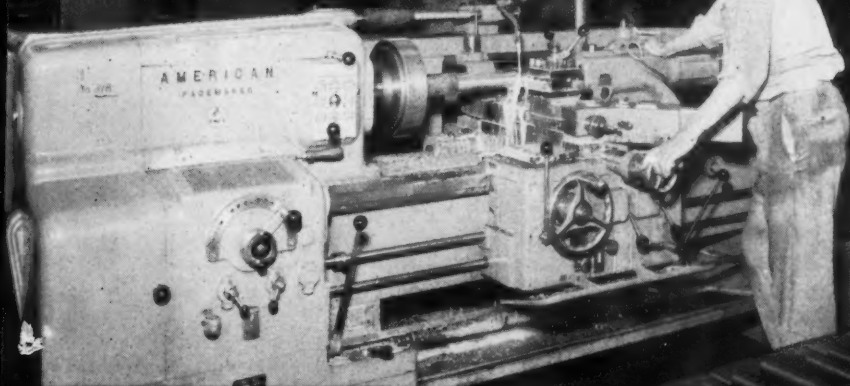
TRADE MARK REG. U S PAT OFF

BOKUM TOOL CO. INC.

14775 Wildemere Ave.
Detroit 38, Mich.

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IT'S FASTER...



IT'S A BIG IMPROVEMENT...

IT'S A MONEY MAKER!

Bulletin No. 135
gives a complete de-
scription and shows
many examples. It's
yours for the asking.

These are exact words from the production officials of The Cleveland Worm and Gear Company, of Cleveland, Ohio, which company produces the universally known and widely used Cleveland Worm Gear Speed Reducers.

The machine to which they refer is their new "AMERICAN" DeLuxe Model Hydraulic Duplicating Lathe. This lathe, as the illustration shows, is used primarily for machining worm forgings from a round template.

Accurate duplication of parts, high speeds, heavy cuts, plenty of power, quick acting air operated tailstock and ease of operation are the major characteristics contributing to the amazing productivity of this machine.

More production per man hour is the answer and only answer to spiraling costs—modern, high production machinery is the answer to greater production per man hour. Judging from reports, The Cleveland Worm and Gear Company has found this to be true.

THE AMERICAN TOOL WORKS CO. Cincinnati 2 Ohio, U. S. A.

LATHES AND RADIAL DRILLS

For more data circle 373 on Postpaid Card



KEEPS CUTTING FLUIDS AS FRESH AS A DAISY

Here's why **ELCIDE 75**™ can increase the useful life of your soluble oil emulsions

Elcide 75 controls harmful bacteria that cause rancid odor, acidic corrosion, and emulsion breakdown. Prior to Elcide 75, certain bacteria developed immunity to commonly used germicides, and no single inhibitor could control their damage to the soluble oil emulsion.

Elcide 75 is a combination of proven anti-bacterial agents, including one of the safest and most powerful bacterial inhibitors used in the exacting field of medical surgery today.

Elcide 75 is not a "built-in additive" that is weakened by larger emulsion ratios. You know it is an effective, safe treatment because you add it to the emulsion in your plant.

Elcide 75 is safe for employees, machinery, and products. It is nontoxic and harmless to sensitive skin, and its anti-bacterial action reduces the chance of infection from contaminated emulsions. The use of Elcide 75 also reduces the corrosion caused by bacterial decomposition.

WHAT ELCIDE 75 MEANS TO THE METALWORKING INDUSTRY...

Actual shop tests show that one ounce of Elcide 75 added to each four gallons of emulsion can keep the oil-water emulsion fresh as much as 5½ times longer. In one test, emulsions that normally had to be dumped at the end of four weeks ran for 22 weeks when treated with Elcide 75! Operating costs can be reduced by three direct savings—costly labor and down time for recharging will decrease, soluble oil requirements will be less, and the disposal cost of spoiled emulsions will diminish. Elcide 75 also contributes to better products and longer machine-tool life by controlling bacteria which often cause acidic corrosion. You can have a cleaner plant with Elcide 75. It eliminates objectionable odors and bacteria that may cause skin infection. Elcide 75 is nontoxic and safe to use, as proved by tests under normal shop conditions.

Put Elcide 75 to work for you. The best way to determine the value of Elcide 75 to your operation is to try it in comparison with your regular emulsions. After you compare costs of operation, you will agree that Elcide 75 deserves a permanent place in your plant.

PRODUCT SPECIFICATIONS ELCIDE 75

(Lilly's brand of bacterial inhibitor
for cutting fluids)

Active Ingredients—Sodium Ethylmercuri
Thiosalicylate (Thimerosal) and Sodium
o-phenylphenate.

Package	Price per Gal.
1-gallon polyethylene	\$8.50
5-gallon polyethylene	\$8.00
55-gallon stainless steel	\$6.50

Sold only through selected distributors.

BACTERIAL PLATE COUNTS PROVE KILLING POWER OF ELCIDE 75



Emulsion treated
with Elcide 75



Emulsion treated with com-
monly used germicide at
recommended level



Emulsion treated with com-
monly used germicide at
double recommended level



Untreated
emulsion

These photographs illustrate the broad, powerful anti-bacterial action of Elcide 75. The light areas are bacterial colonies that have grown in three of the emulsion samples during 8 weeks' use. Note that none of these harmful bacteria appear in the emulsion treated with Elcide 75.

For further information or to place your order, write or phone:

ELCIDE 75

PATENT PENDING



ELI LILLY AND COMPANY, AGRICULTURAL AND
INDUSTRIAL PRODUCTS DIV., INDIANAPOLIS 6, IND.

Tel.: MEIrose 6-2211

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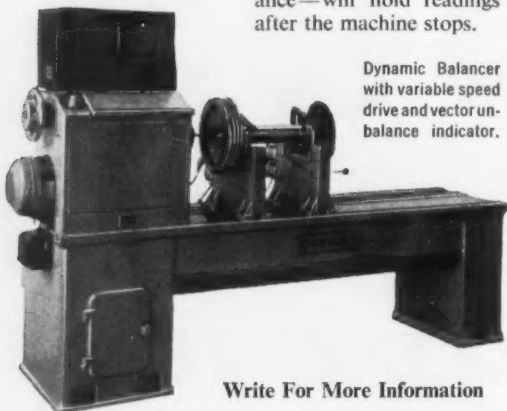
PRODUCTION . . . BALANCING

WITH

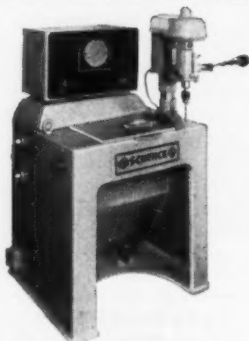
SCHENCK

ELECTRO-DYNAMIC BALANCING MACHINES

Schenck Electro-Dynamic Balancing Machines offer many unequalled advantages of speed, sensitivity, accuracy and ease of operation. They will automatically indicate dynamic or static unbalance on rotating parts (1) in a single run of less than a minute, (2) without adjustment of springs or protractor dials, (3) without the need for electronic tubes or amplifiers, (4) to as little as .00002" (twenty millionths) displacement from center of gravity. The watt-metric measuring circuit is immune to non-unbalance vibrations—gives positive plane separation—permits calibration of indicator readings in any measuring unit—provides separation of pure dynamic and pure static unbalance—will hold readings after the machine stops.



Dynamic Balancer with variable speed drive and vector unbalance indicator.



Static Balancer with associated drilling unit.

Versatility Choice of either a component meter for predetermined correction spots, or a Vectormeter for correction in any angular location. Rotor is driven by drive shaft, belt, or compressed air, or may run under own power. Any power combination possible.

Measuring Ranges (Rotor weight) Horizontal Balancers—from .25 oz. to 220,000 lbs.; Vertical Balancers—from .2 lbs. to 1100 lbs.

Write For More Information

COSA

—nationwide sales and service of precision machine tools—
—from bench lathes to boring mills.

COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N. Y.
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a complete line

**is the shortest
distance to
top production**

The shorter the distance the less the cost. Butterfield taps save time, help you improve product quality and cut production costs.

There are Butterfield warehouses in Chicago, Cleveland, Detroit, Fort Worth, Los Angeles, New York, San Francisco.

See your Butterfield Distributor for precision-made drills, reamers, taps, dies, counterbores, cutters, end mills, hobs and carbide tools.



368.8.10

BUTTERFIELD

... the cutting tools that make the most of your product

BUTTERFIELD DIVISION, UNION TWIST DRILL COMPANY, DERBY LINE, VERMONT
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November, 1958

modern machine shop 75

AUTOMATIC COMPENSATION FOR MISALIGNMENT WITH EMPIRE FLOATING TOOL HOLDERS AND TAP HOLDERS

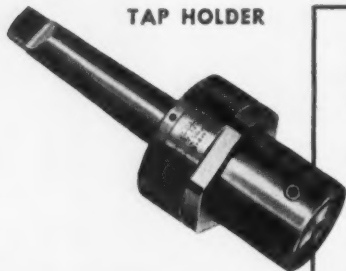
Check These Exclusive Empire Floating Tool Holder Features:

- Automatically compensates for both angular and parallel misalignment.
- Eliminates bell mouthed and over-sized holes—permits extremely close tolerance work.
- Free and easy movement . . . tool holder sleeve and shank float independently of each other.
- Amount of float is infinitely adjustable.
- Smoother running . . . moving parts ride on rollers.
- Minimum of maintenance . . . holder has only five parts.

TOOL HOLDER



TAP HOLDER



Standard equipment with leading Machine Tool Manufacturers. Tool Holders and Tap Holders are available with either straight or tapered shanks.

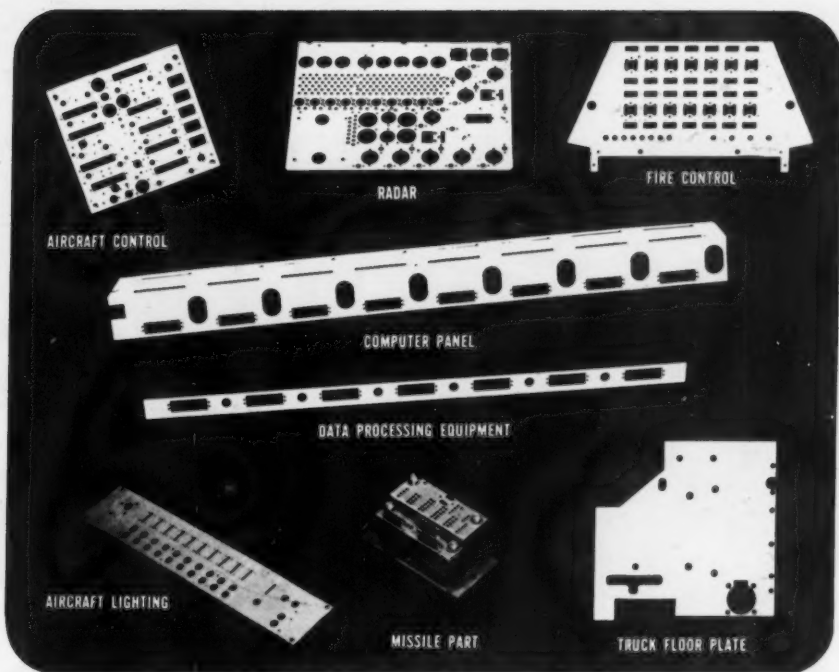
Check These Exclusive Empire Floating Tap Holder Features:

- Automatically corrects parallel and angular misalignment.
- Designed to prevent freezing under tension—taps float in and out.
- Wide range of float—simple adjustment lock-nut provides accurate control of degree of float.
- No springs or pivot members to restrict float.
- Floatation feature makes it easier to hold close tolerances.

EMPIRE TOOL COMPANY

11503 LAMBS ROAD • MEMPHIS, MICHIGAN

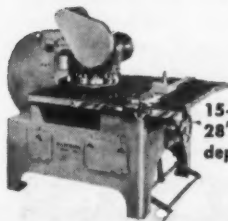
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"DELIVERY YESTERDAY?"

... with a Wiedemann Turret Punch Press, you can pierce sheet metal components of 'most every type in 60% to 90% *less time*—and meet those "impossible" deadlines profitably.

It will pay you to get the facts from Wiedemann. Write for Bulletin 301.



RA-41P Wiedemann
15-ton capacity
28" throat
depth

Ask any WIEDEMANN User

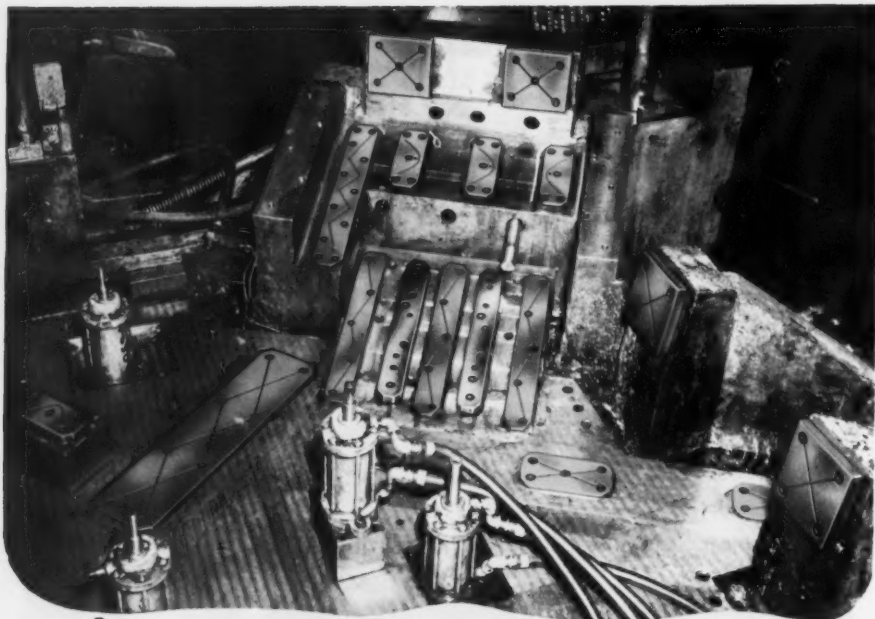
WIEDEMANN
MACHINE COMPANY
TURRET PUNCH PRESSES

Other models from 4 to 150 tons

DEPT. MM11 • GULPH ROAD • KING OF PRUSSIA, PA.
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November, 1958

modern machine shop 77



THEY'RE **OK** HERE



... long wearing,
economical
OK aluminum bronze wear plates

Practically every important automobile manufacturer now uses OK aluminum bronze wear plates on body dies.

By a unique cladding process, long-wearing aluminum bronze is bonded to a machinable steel base. Cost is drastically lower when compared to solid cast bronze plates. A finer quality bearing surface is obtained, resulting in longer life. When fitting is required to suit die, steel backing of plate is easily machinable, and no difficulty is encountered drilling

or counter boring through bronze surface. OK aluminum bronze plates are applicable wherever a die has a sliding or cam action. A large selection of sizes of OK aluminum bronze plates is carried in stock . . . finished ground, flat and parallel . . . ready to ship. Simply send your drawings or sketches to our engineering department.

Manufacturers for the metalworking industry of: SLITTER KNIVES • SHEAR BLADES • BRONZE WAYS • WORK-REST BLADES • CUT-OFF BLADES • SCRAP CHOPPERS • HARDENED SPACERS • BALL RACES • HARDENED WAYS • WEAR STRIPS • GIBS

For free bulletin "SLITTING"—A Basic Guide for the New Operator", write Dept. 12-HH

THE OHIO KNIFE CO.

CINCINNATI 23, OHIO

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15 years — — and still going strong

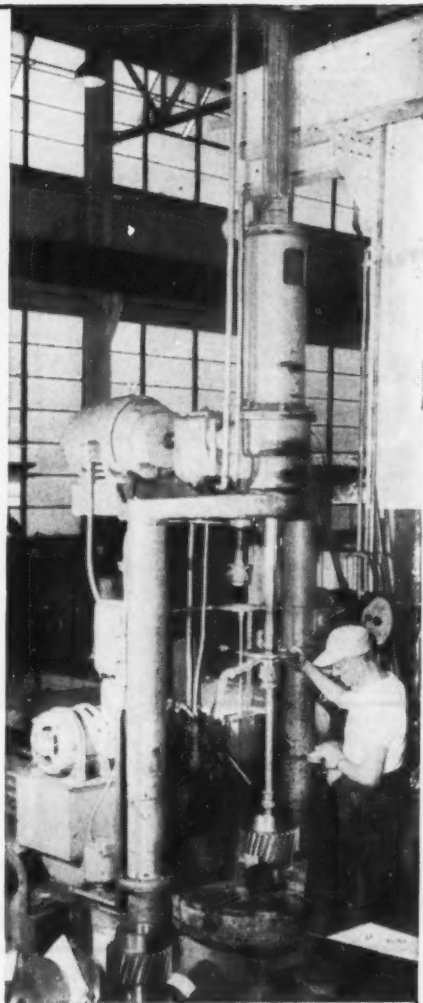
IT'S old stuff for Fulmer Honing Machines and we never make a fuss about it. Many a Fulmer does this right along . . . it's one reason why you rarely see one in the "Used Machinery" offers.

Fulmer Honing Machines

**OFFER MAXIMUM
HONING VALUE**

For honing internal bores—any size—any type—you just can't better Fulmer quality and economy.

Write for Bulletin on Honing and case histories. Also, get Honing Computer FREE.



C. ALLEN FULMER CO., Dept. S, 107 E. 4th St., Cincinnati 2, Ohio

FULMER

*the
World's
Best*

HONING EQUIPMENT

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Pick your pump from the fulflo line



Write for your
copy of "FULFLO
PUMPS MECHANICAL
DATA BOOK"

CENTRIFUGAL COOLANT PUMPS
cool choice for dependable coolant delivery!

FULFLO DIRECT-CONNECTED

- Can be arranged for belt drive
- Right or left rotation
- Self-contained priming chamber
- Automatic packing adjustment
- Hardened steel sleeve shaft
- Pipe sizes $\frac{3}{8}$ " to $1\frac{1}{2}$ "

FULFLO MOTOR-DRIVEN

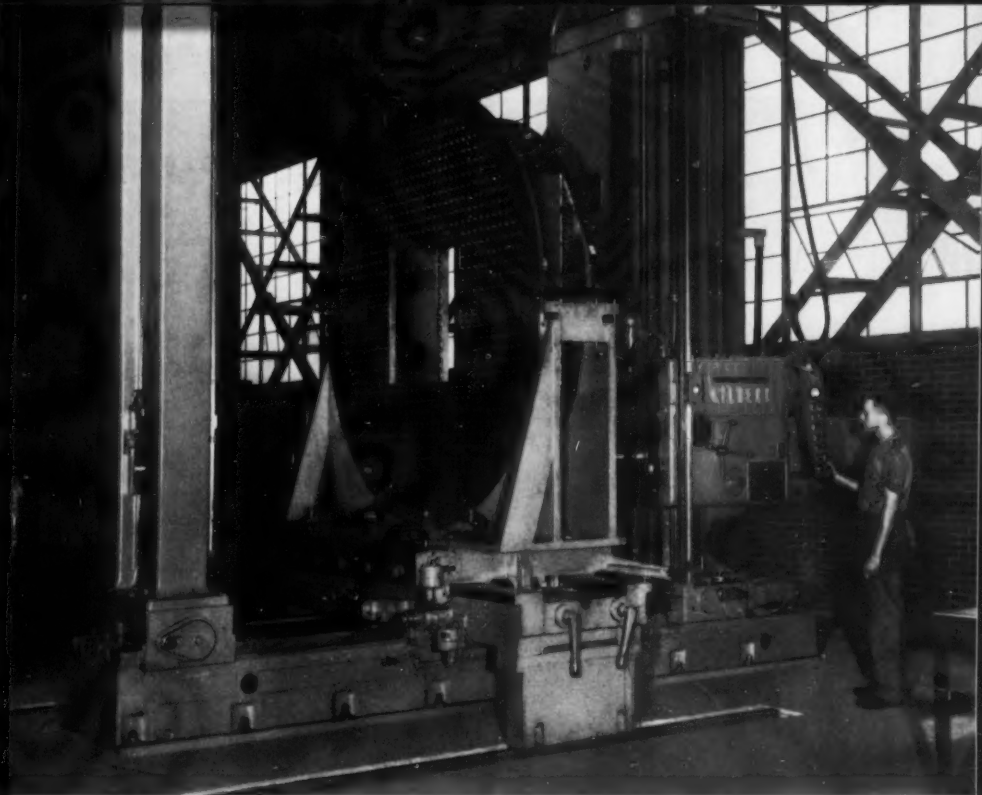
- Special motors with heavy duty ball bearings, totally-enclosed, splash-proof frames
- Centrifugal action insures pumping regardless of chips or grit
- For practically any type of installation

<p>Model PS4 1800 to 2600 rpm $3\frac{1}{2}$ to 5 gpm</p> 	<p>Model FS4 1800 to 2400 rpm 35 gpm at 1800 rpm</p> 	<p>Model KGTS4 1600 to 2400 rpm 12 to 16 gpm</p> 
<p>Model AGM $\frac{1}{4}$ to 1 hp sizes</p> 	<p>Model 2ES4 1600 to 2400 rpm 10 to 30 gpm</p> 	<p>Model FMS Vertical and Horizontal $\frac{1}{4}$ hp; 30 gpm flange mount</p> 



THE FULFLO SPECIALTIES CO., INC., 416 FANCY AVE.—BLANCHESTER, OHIO

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Courtesy Combustion Engineering, Inc.

Combustion Engineering uses Gilberts for precision boring on atomic reactors

It takes an unusual boring mill (specifically, a Cincinnati Gilbert) to meet the specifications on this job:

- (a) diameters within .001",
- (b) parallelism of center line of holes to center line of plate within .0001" per inch,
- (c) parallelism of flat surfaces within .010",
- (d) 32 R.M.S. surface finishes.

These are some of the machining requirements on this part for a fast breeder reactor built in the Chattanooga plant of Combustion Engineering, Inc., pioneer manufacturer in the nuclear field. They are typical of

the quality of work assigned to this Cincinnati Gilbert table type horizontal boring mill. Automatic positioning makes work-handling fast and precise.

A number of other Gilbert boring mills are producing similar close-tolerance work for Combustion Engineering—proof that "those who buy Gilbert buy Gilbert again."

New Bulletin 1157 will show you why Gilbert boring mills do so many things so well.
The Cincinnati Gilbert Machine Tool Co., 3348 Beekman Street, Cincinnati 23, Ohio.

those who buy **GILBERT** *buy Gilbert again*

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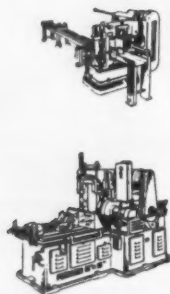
November, 1958

modern machine shop 81

NEW...the only band saw with



automatic feed pressure control



The PEERLESS High Speed Production Band Saw provides industry with an all new metal cutting machine for sawing billets, heavy bars, pipe and structural shapes in a fraction of the time of any cut-off machine of comparable capacity. Compensating feed unit automatically regulates blade pressure at all times, maintains sawing operation at 100% efficiency and eliminates blade breakage. Exclusive counterbalanced saw frame feature protects work, blade and operator. Dual feed single lever control.

For dealer nearest you write—



PEERLESS MACHINE COMPANY
RACINE, WISCONSIN

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RED-HOT METAL

no fire hazard!



(Above) Red-hot steel slabs, weighing over 2 tons each, are at arm's length from hydraulic lines filled with Irus Fluid 902 —YET NO FIRE HAZARD.

(Right) The distinctive yellow color of Irus Fluid makes it easy to spot and trace hydraulic line leaks.



“After numerous tests, we selected Shell Irus Fluid 902 because of its excellent fire resistance and low cost,”

says Norman Bracht, Lubrication Engineer, Alan Wood Steel Company, Conshohocken, Pa.

A strip-mill fire convinced the Alan Wood Steel Company that a switchover to a fire-resistant hydraulic fluid was imperative. After testing various types, Shell Irus Fluid 902 was selected. Now . . . a year later . . . Alan Wood is convinced that hydraulic fires at the strip-mill tilt table are a thing of the past.

Irus* Fluid 902 is a water-in-oil emulsion with exceptional fire resistance. Plant

tests show that Irus Fluid 902 *actually snuffs out fire!* Alan Wood Steel also discovered that Irus Fluid is economical . . . costing much less than other fire-resistant fluids with comparable performance.

For complete technical information on Shell Irus Fluid 902, write: Shell Oil Company, 50 West 50th St., N. Y. 20, N. Y. or 100 Bush St., San Francisco 6, Calif.

*Registered Trademark

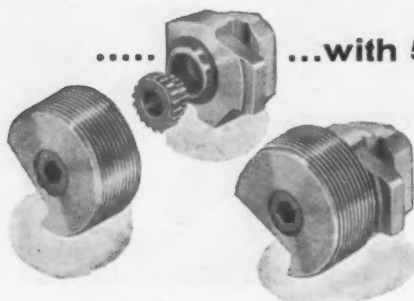
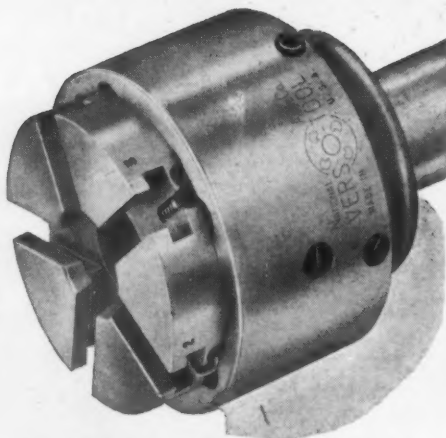
SHELL IRUS FLUID 902

a low-cost, fire-resistant hydraulic fluid

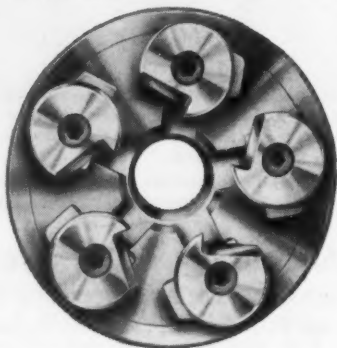
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IMPROVE THREAD QUALITY AT COST SAVINGS YOU CAN MEASURE



.... **...with 5 chaser Vers-O-Tools**



**Available from stock
in sizes from $1\frac{3}{16}$ " to $3\frac{1}{2}$ "**

The superiority of Vers-O-Tool automatic die heads has been proven in thousands of applications. Basic design simplicity, unsurpassed economies in chaser grinding and precise relocation of chasers without re-adjustment . . . all have contributed to better threaded pieces at lower cost.

Now with 5 chaser heads available in a complete range of sizes . . . add up these conclusive facts—and prove it to yourself!

Write for complete information

- Elimination of out of round and drunken threads
- Chasers can be ground closer to center, resulting in smoother, more accurate threads
- 5 Chasers lighten the chip load on each tool
- Longer chaser life per grind—less machine down time
- 5 Chasers permit threading of parts with flats, slots, keyways, etc.

National Acme

THE NATIONAL
ACME COMPANY
183 East 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.

For more data circle 386 on Postpaid Card

... now your distributor can supply **both**

Bunting®

**CAST OR
SINTERED BRONZE**

Fast pick-up...

Stock sizes of Bunting Cast Bronze and Sintered Bronze Bearings and Bars are available everywhere in America. Every one is a precision product of scientifically exact manufacturing methods, meeting on every point the highest standards of quality as defined by modern mechanical engineering and metallurgy.

FIRST AWARD
For Advertising Excellence
Distributors Associations
1952 1956 1958



Your Bunting distributor is listed in the classified section of your telephone directory usually under Bars—Bronze, and Bearings—Bronze. Two Bunting factories and eleven Bunting Branch Warehouses expedite distribution in all areas. Ask your local Bunting distributor or write for catalogs.

Bunting®

**BUSHINGS, BEARINGS, BARS AND SPECIAL PARTS
OF CAST BRONZE AND POWDERED METAL**

THE BUNTING BRASS AND BRONZE COMPANY • TOLEDO 1, OHIO • BRANCHES IN PRINCIPAL CITIES

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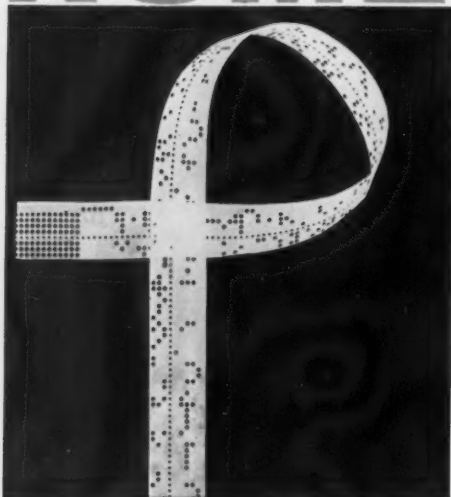


Ask for
Catalog No. 58-Cast Bronze and Sintered
Bronze Bearings and Bars
Catalog No. 258-Electric Motor Bearings
and Cast Bronze Bars

November, 1958

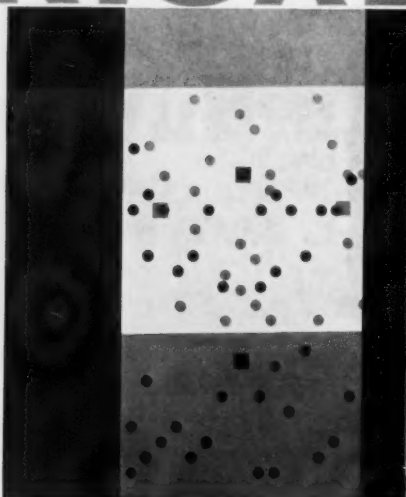
modern machine shop 85

NUMERICAL



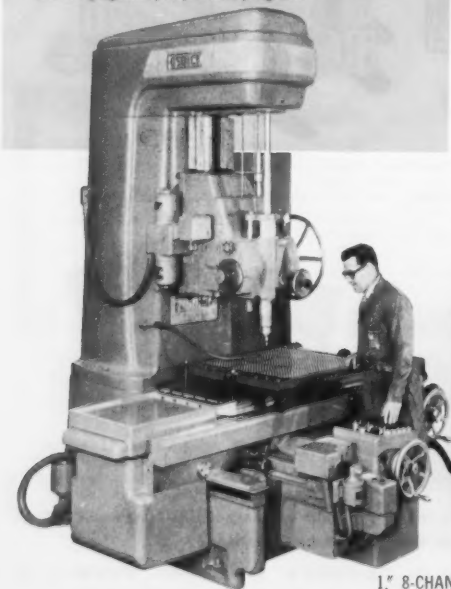
1" 8-CHANNEL COMMUNICATIONS TAPE

Inexpensive, widely used throughout industry, these tapes may be prepared simply on a Flexowriter or similar equipment, usually by the Production Engineering Dept. Provides a typewritten record automatically for easy checking against pre-planned program.



4" MYLAR PLASTIC TAPE

Least expensive of the generally accepted tape system particularly suitable for smaller shops machining parts with relatively few holes. Tape can be prepared easily by shop personnel.



1" 8-CHANNEL COMMUNICATIONS TAPE



4" MYLAR PLASTIC

CONTROL

for Fosmatic JIG BORERS and JIG GRINDERS



PUNCHED CARDS

This system can be integrated with card systems already in use by your company. Each job is programmed in a "deck" of cards; provides great flexibility, since an operation can be added or eliminated simply by making a new card or removing an old one.

Any tape or card reader can be used to control a Fosmatic Jig Borer or Jig Grinder. And because the functions of the standard Fosmatic are actuated electrically, numerical control can be installed in the field—economically!

Speeds and feeds are changed by controlling electro-magnetic clutches through relay contacts. Table and saddle position is determined by a measuring system actuated by direct reading dials. For numerical control, these dials are driven by a fractional hp motor.

On a Fosmatic, you can program as many functions as you wish. Table X and Y positions (to .0001"), Feeds and Speeds, Spindle start and stop, Spindle feed start and stop, Spindle feed depth, Spindle head height, Automatic tool change. And only Fosmatic gives you a visual numerical check of coordinate location plus operation sequence number.

Example of savings made with Fosmatic numerical control. The illustration (left) shows one half of a mold with 900 cavities, each of which requires nine operations—a total of 8100! Time for the entire job was 100.25 hours, 25% of time consumed previously on a conventional jig borer.

Write or call today for complete information on a numerically controlled jig borer or jig grinder to improve your production method.



PUNCHED CARDS

Buy a Fosmatic today—add Numerical Control tomorrow



Get a Proposal from

FOSDICK

THE FOSDICK MACHINE TOOL CO.
CINCINNATI 23, OHIO

For more data circle 389 on Postpaid Card

A NEW LINE OF **DAKE** *air hydraulic* **PRESSES**



FOUR NEW MODELS

25 TONS provides easy operation, low cost, and speed for general pressing and production work.

50 TONS for assembling, straightening, bending in minimum time.

75 TONS for handling heavy-duty press jobs quickly and easily. Ideal for machine shops, tool and die shops.

150 TONS for extra-heavy press work in heavy industry. This press is recommended for construction work, fabrication, and repair work requiring extra-heavy pressures.

CHECK THESE IMPORTANT **DAKE** FEATURES

- ✓ **Rapid Ram Approach**—automatically changes to power stroke when it contacts the work.
- ✓ **Movable Workhead**—self-contained, easy to center over work. Workhead can be purchased separately.
- ✓ **Modern Design**—all of the operating controls are at convenient working height.
- ✓ **Extra Long Stroke**—handles long pressing jobs more easily.

DAKE CORPORATION, 612 Robbins Road, Grand Haven, Michigan



Arbor Presses



Hand-Operated Hydraulic



Power-Operated Hydraulic



Guided Platen



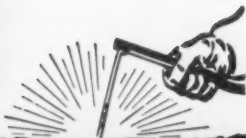
Gap Type Presses



Movable Frame

For more data circle 390 on Postpaid Card

Weldynamics



ARC WELDING AT WORK CUTTING COSTS

WHY WELDORS AND MANAGEMENT LIKE IMPROVED FLEETWELD 47



Improved Fleetweld 47 gives that fast, easy operation ... yet it isn't limited to the flat position.

Weldors appreciate the smooth flowing action!

Management loves the cost-cutting speed and versatility.

Try Improved Fleetweld 47 on your next flat and uphill production job. You'll love it too! It conforms to AWS E-6013 and E-6014.

Write for the *new* Weldirectory Bulletin 7000.1.

Lincoln men who know Weldynamics will help you establish procedures, select equipment and electrodes for most efficient, low-cost welding.

*The World's Largest Manufacturer
of Arc Welding Equipment*



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THE LINCOLN ELECTRIC COMPANY, DEPT. 3522, CLEVELAND, OHIO
For more data circle 391 on Postpaid Card

November, 1958

modern machine shop 89

free literature

**Use Postpaid Cards opposite page 32
and inside back cover for requesting
free copies of literature listed below.**

Dial Indicator Checker

Go-Devil Instrument Co., 624 Dutchess Turnpike, Poughkeepsie, N. Y. This flyer gives information on the Go-Devil Monitor, which is a dial indicator checker and self-mastering comparator for inspection departments, toolrooms, gage laboratories, indicator repair departments, production departments, grinding departments, receiving inspection, model shops and so on.

For more data circle 1 on Postpaid Card

Marking Tools and Machinery

Geo. T. Schmidt, Inc., 1806 West Belle Plaine Ave., Chicago 13, Ill. Catalog No. 16 describes and illustrates a complete line of marking tools, marking machinery and equipment. Included in this 192 page catalog are sections on engraved stamping dies, type and type holders, embossing and coining dies, hand stamps, nameplate marking tools, numbering heads, hand, pneumatic, hydraulic and mechanical marking machines and tools for every marking application.

For more data circle 2 on Postpaid Card

Drill Jig Bushings

Standard Bushing Manufacturers, Inc., 1485 Elmwood Ave., Providence 7, R. I. Catalog No. 582 contains detailed information and illustrations of the Standard line of drill jig bushings.

For more data circle 3 on Postpaid Card

Adjustable Storage Racks

Palmer-Shile Co., 16022 Fullerton, Detroit 27, Mich. A pictorial presentation of the many uses to which the company's adjustable storage racks are being put in industry is contained in this brochure.

For more data circle 4 on Postpaid Card

Boring Machines

Ex-Cell-O Corp., Detroit 32, Mich. This new and comprehensive 88 page catalog is wire bound. It contains information on precision boring machines, custom and transfer machines, precision and thread grinders, miscellaneous grinding machines and grinding equipment, jet blade profiling and finishing machines, vertical contouring machines, vertical boring machines, together with precision spin-dies. Other products include railroad pins and bushings, precision drill jig bushings, counterbores, face mills and broaches.

For more data circle 5 on Postpaid Card

Milling Machine

Sundstrand Machine Tool Co., 2539 Eleventh St., Rockford, Ill. This bulletin contains information and illustrations on the C1 Mechanical Feed Rigidmil and attachments for same.

For more data circle 6 on Postpaid Card

Lubricants

Chicago Manufacturing and Distributing Co., 1910 West 46th St., Chicago 9, Ill. Four page bulletin concerns the CMD Anti-Scoring Lubricants for high production. The bulletin describes and illustrates several applications of the anti-scoring lubricants.

For more data circle 7 on Postpaid Card

15 Inch Lathe

Sheldon Machine Co., Inc., 4250 North Knox Ave., Chicago 41, Ill. Circular points out that this lathe has been designed to fill the gap between geared head and belt driven lathes. Complete details and specifications are included.

For more data circle 8 on Postpaid Card

NOW—A LOW-COST LAPMASTER

*Specifically
Designed for
Maintenance
Lapping*

new

Lapmaster
MODEL 10



Saves Time and Money On:

**VALVE SEATS • MECHANICAL SEALS
COMPRESSOR DISCS • DIESEL INJECTOR
AND OTHER MISCELLANEOUS PARTS**

- Faster than old lapping methods.
- Consistently laps to flatness within .0000116" and micro-inch finishes of 2 to 3 RMS.
- Operator need not be experienced.
- Handles parts up to 7" diameter to meet all usual maintenance lapping needs.
- Will handle parts of any shape or form... any metal, ceramics or plastic.
- Automatically controlled lapping cycle.
- Size: 18" x 13" x 12". Weight: 133 lbs.
- Operates on any 110 volt—60 cycle—single phase outlet.

NO TIME LOST

**in Reconditioning
Lap Plate with Exclusive
LAPMASTER PRINCIPLE**



No down time for truing lap plate
... conditioning rings automatically
keep plate flat and true.

Lapmaster
...THE
MACHINE THAT PUT
PRECISION LAPPING ON A
PRODUCTION BASIS

WRITE FOR THE COMPLETE LAPMASTER STORY

Write for bulletins describing
the Lapmaster line and
chart on measuring flatness.



A product of

• **Crane Packing Company**

6418 OAKTON ST. • MORTON GROVE, ILL. (Chicago Suburb)
In Canada: Crane Packing Company, Ltd., Hamilton, Ont.

For more data circle 392 on Postpaid Card

Reamers

Twentieth Century Manufacturing Co., Route 176 and Bradley Rd., Box 429-M, Libertyville, Ill. This catalog concerns Superream Chucking Reamers in decimal sizes, Supreme Hand Reamers in fractional and decimal sizes, Supreme Stub Reamers in decimal sizes, Superbore Counterbores, stop pins, finger stops and so on.

For more data circle 9 on Postpaid Card

Air Gage Tracer

The Monarch Machine Tool Co., Sidney, Ohio. Booklet No. 2609 gives comprehensive data on the function and performance of the air gage tracer contour system for metalworking operations, including precision turning, facing and boring work. This is a 36 page booklet which is illustrated with schematics, photographs and line drawings.

For more data circle 10 on Postpaid Card

Carbide Gun Drills

Star Cutter Co., Post Office Box 376, 34500 Grand River Ave., Farmington, Mich. A four page, two color, profusely illustrated catalog (SC-110) describes Starbore Carbide Gun Drills for high speed production of precision holes from the solid.

For more data circle 11 on Postpaid Card

Surface Roughness

Micrometrical Manufacturing Co., 345 South Main St., Ann Arbor, Mich. Four page bulletin entitled "Why Have Horse and Buggy Arguments on Surface Roughness in a Jet Age?" shows how foolish and expensive it is to argue about surface roughness, since the Profilometer has been engineered to remove all of the guesswork and come up with the right answers.

For more data circle 12 on Postpaid Card

Roller Bearings

The Torrington Co., Bantam Bearings Division, South Bend 21, Ind. Catalog No. 258 covers five standard series of self-aligning spherical roller bearings, with bore sizes ranging from 40 up through 1,060 mm. Complete dimension tables, load ratings expressed as basic dynamic capacity and line graphs, showing modifying speed and life factors, help the designer to choose quickly and easily the proper bearing for each application.

For more data circle 13 on Postpaid Card

Environmental Chambers

Webber Manufacturing Co., Inc., Post Office Box 217, Indianapolis 6, Ind. This 27 page colorful catalog concerns the Webber Environmental Chambers. It gives standard specifications, technical information, environmental applications, product applications, partial list of industrial users and so on.

For more data circle 14 on Postpaid Card

Bronze Bushings and Bearings

The Bunting Brass and Bronze Co., Toledo 1, Ohio. Catalog No. 58 gives complete data on the company's bronze bushings and bearings.

For more data circle 15 on Postpaid Card

Stainless Steel Tubing

Babcock and Wilcox Co., Tubular Products Division, Beaver Falls, Pa. Bulletin 415 explains how welded stainless steel heat exchanger and condenser tubes are made and points out the advantages of using fully annealed tubing.

For more data circle 16 on Postpaid Card

Workholders

Lassy Tool Co., Plainville, Conn. This catalog contains information on workholders, gang fixtures, tappers, tap and die guides, adapters, accessories for tapping and threading, vises, angle plates and so on.

For more data circle 17 on Postpaid Card

Boring Mills

The Cincinnati Gilbert Machine Tool Co., 3348 Beekman St., Cincinnati 23, Ohio. This 12 page brochure describes in detail the floor type horizontal boring, drilling and milling machines with 4 and 5 inch spindles.

For more data circle 18 on Postpaid Card

Heavy Duty Punches

Ring Punch and Die, Inc., 11 Fenton Place, Jamestown, N. Y. Catalog No. 105 gives complete information on the heavy duty solid head type punches, which can be supplied in round, square, oblong or rectangular points.

For more data circle 19 on Postpaid Card

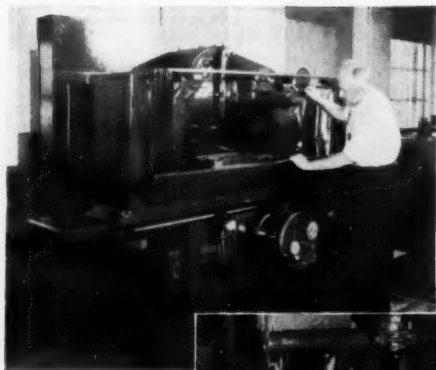
Balancing Machine

Balance Engineering Co., 5030 West Lake St., Chicago 44, Ill. Three bulletins give complete information on the Beko Dynamic and Static Balancing Machines.

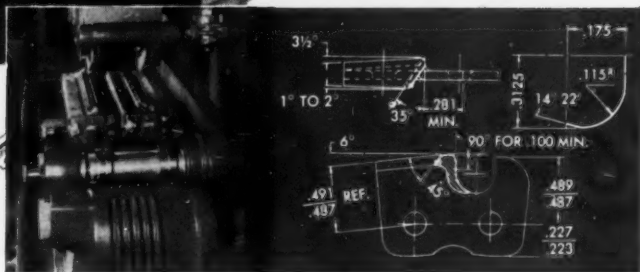
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Thompson

TRUFORMING CUTS COSTS 60%



BLUE
JET
CHAIN



For 140 years, the policy of The Draper Corporation of Hopedale, Mass., has been to offer the highest quality product at the least possible cost.

Following this policy, its subsidiary, BlueJet Corporation, manufacturers of the famous BlueJet saw chain, installed a Thompson Truforming grinder to grind the cutting edges on their chain saw routers. These routers were formerly ground, piece by piece, by a force of 8 employees.

The Thompson Truforming operation is now cutting former grinding costs by 60%. 3 men only are now required for the operation. 40 L.H. and 40 R.H. routers are now ground simultaneously

with one pass of the crush formed wheel, resulting in a day's production of over 12,000 pieces—many times that produced by the former method. Both the uniformity and sharpness of the routers have been greatly improved.

For 25 years, Thompson has pioneered and developed the modern advances in crush form grinding. If you have a time-saving, product-improving or cost-cutting problem in your operations, it will pay you to investigate the work Thompson Truforming grinders are now doing in plants all over the country. Our engineering experience is available to you without obligation. Write for Catalog T558.

"Keep Thompson in mind for the daily grind"

**THE THOMPSON
GRINDER COMPANY**
SPRINGFIELD, OHIO

For more data circle 393 on Postpaid Card

November, 1958



SURFACE
GRINDERS

modern machine shop 93

Special Production Tools

McCrosky Tool Corp., Meadville, Pa. Bulletin No. S-19 is a 16 page catalog which illustrates and describes a wide variety of tools, specially designed to combine two, three, four or more related machining operations, do them all at the same time with just one tool and one setup.

For more data circle 21 on Postpaid Card

Tool and Die Milling Machine

The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. Six page folder describes and illustrates the Cincinnati 1-C Contourmaster Tool and Die Milling Machine with three dimensional hand guided hydraulic tracer mechanism.

For more data circle 22 on Postpaid Card

Universal Nibbler

Amplex Engineering Co., Inc., New Castle, Ind. This flyer gives information on the Amplex Rapid Universal Nibbler and the operations that it can perform.

For more data circle 23 on Postpaid Card

Marking Machine

Pryor Marking Products, 434 South Wabash Ave., Chicago 5, Ill. Leaflet on the Model E. P. 34 General Purpose Marking Machine and accessories.

For more data circle 24 on Postpaid Card

Hydraulic Power Pump

Greenlee Tool Co., 1988 Herbert Ave., Rockford, Ill. Bulletins No. E-223 and 797-E-SA give complete facts about the Greenlee Hydraulic Power Pumps, designed for simple, speedy operation of hydraulic pipe and conduit benders, knockout punch drivers, rams, jacks, presses and other hydraulically driven units.

For more data circle 25 on Postpaid Card

Universal Coupling

Olson Industrial Products, Inc., 40 West Water St., Wakefield, Mass. This 15 page brochure provides complete descriptions and illustrations of the Tru-ax Universal Coupling, which has been designed for speed and stability and which corrects angular and parallel misalignment.

For more data circle 26 on Postpaid Card

Vibrating Feeders

Syntron Co., 309 Lexington Ave., Homer City, Pa. Amply illustrated 30 page catalog on standard and special model electromagnetic vibrating feeders for hard to handle bulk materials.

For more data circle 27 on Postpaid Card

Caliper

Polyplan Co., 45 West 81st St., New York 24, N. Y. This color bulletin gives information on Polyplan Calipers with a reading of 1/1000th inch.

For more data circle 28 on Postpaid Card

Lubricating Devices

Trico Fuse Manufacturing Co., Milwaukee, Wis. This catalog gives information and illustrates on automatic oilers, industrial fuses, fuse pullers, fuse reducers and fuse and test clamps.

For more data circle 29 on Postpaid Card

Cemented Carbide Products

Kennametal, Inc., Department 59, Latrobe, Pa. This 50 page two color bulletin—Catalog No. 59—includes base price and quantity extra table data and illustrations on Kendex tools and boring bars, standard blanks, brazed tools, clamped inserts and Kennamills.

For more data circle 30 on Postpaid Card

Mist Coolant Generator

Aetna Manufacturing Co., 174 South York Rd., Bensenville, Ill. Four page illustrated folder and data sheets are available concerning the Mist Mist Coolant Generators.

For more data circle 31 on Postpaid Card

Precision Measuring Tools

George Scherr Co., Inc., 200-MM Lafayette St., New York 12, N. Y. Six page folder describes and illustrates the Scherr Micro-Projector and gives brief information on a dynamometer, microscope, indicators, tachometers, comparators and a binocular microscope.

For more data circle 32 on Postpaid Card

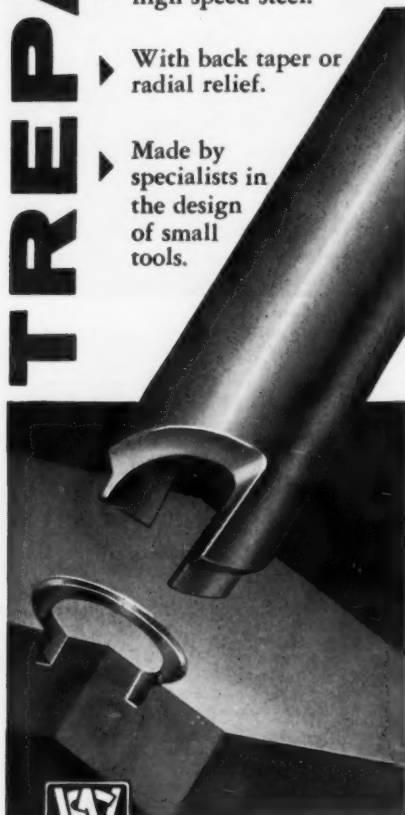
Rolls

Grob, Inc., Grafton, Wis. The Grob Roll—No. 10—has 6 to 12 inch capacity with an 8 foot bed. It produces strong, accurate and smooth gear and spline shapes.

For more data circle 33 on Postpaid Card

TREPANS

- ▶ Maximum Diameter — $\frac{5}{8}$ inch.
- ▶ For fast-production, multi-spindle machines.
- ▶ Specially heat-treated, high speed steel.
- ▶ With back taper or radial relief.
- ▶ Made by specialists in the design of small tools.



WOODRUFF & STOKES CO.
INCORPORATED

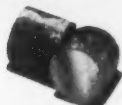
Bldg. 32, 357 Lincoln St., Hingham, Massachusetts
For more data circle 394 on Postpaid Card
November, 1958

TECHNITE® POWER HACK SAW BLADES

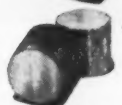
stay hard,
sharp and
accurate



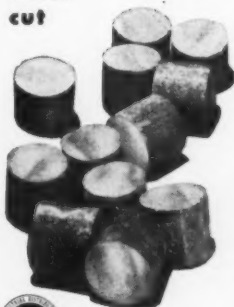
cut



after
cut



after
cut



See Your Capewell Distributor



THE CAPEWELL MFG. CO.
HARTFORD 2, CONN.

For more data circle 395 on Postpaid Card
modern machine shop 95

Buy them
SHARPER... not **CHEAPER!**

It's smart to buy P & W Reamers because they cut faster and cleaner; produce more smooth, accurate holes per tool due to exclusive P & W surface treatment. Results: a big bonus in work quality and out-put, and dollars saved on tool costs! Write now for complete information or phone the P & W Branch Office near you.

REAMERS

AVAILABLE FROM STOCK IN A COMPLETE RANGE OF SIZES AND TYPES AT THE P & W BRANCH OFFICE NEAR YOU

For more data circle 396 on Postpaid Card

free literature . . . (For free literature use postpaid card opposite inside back cover)

Cut Machining Units

Wallace Supplies Manufacturing Co., 1304 Diversey Parkway, Chicago 14, Ill. Pocket size, 36 page, well illustrated book on the complete line of Wallace Cut-Off Saws.

For more data circle 34 on Postpaid Card

Pneumatic Sander

Watervliet Tool Co., Inc., Albany 4, N. Y. Data sheets on the Watervliet High Speed Pneumatic Handy-Sander and portable lift.

For more data circle 35 on Postpaid Card

Belt Sander

Boice-Crane Co., 937 West Central Ave., Toledo 6, Ohio. This illustrated, 52 page catalog fully describes a line of band saws, contour saws and band filers, jig saws, saw jointers, saw tables, shapers and shaper cutter, drill presses, tool and knife grinders, jointers, lathes, planers, belt and spindle sanders, spinning tools, motors, controls, supplies and accessories.

For more data circle 36 on Postpaid Card

Press Room Equipment

Cooper Weymouth, Inc., 600 Honeyspot Rd., Stratford, Conn. Catalog No. 58 contains complete information on air operated slide feeds, mechanical slide feeds, part straighteners, stock straighteners, combination cradle straighteners, wire straighteners, stock reels, scrap choppers and press safety guards. This is a 16 page color fully illustrated catalog.

For more data circle 37 on Postpaid Card

Drilling and Tapping Heads

Commander Manufacturing Co., 4224 West Kinzie St., Chicago 24, Ill. Catalog No. 1000 gives complete information on the Multi-Drill, Multi-Tapper, spindles and accessories for each of these units, the Commander Tapper, the Lead-Matic Tapper, Pneumatic Tapper, Select-A-Spindle Dual Speed Drill Press Turret, drill chip breaker and the Multi-Angle Drill Unit.

For more data circle 38 on Postpaid Card

Magnetic Equipment

Stearns Magnetic Products, 635 South 28th St., Milwaukee 46, Wis. This bulletin summarizes the full range of magnetic equipment offered by the company. Products described include equipment for protection against tramp iron, such as magnetic pulleys, suspended magnets, drum, plate, grate and spout magnets and the electronic metal detector.

For more data circle 39 on Postpaid Card

Toolroom Shaper

Jersey Manufacturing Co., 442 Livingston St., Elizabeth 1, N. J. Illustrated literature describes the Jersey H-20 Precision Toolroom Shaper, which is guaranteed for an accuracy of plus or minus 0.0004 for 6 inches.

For more data circle 40 on Postpaid Card

Air Gun

Air-Way Pump and Equipment Co., 1046 North Kilbourn Ave., Chicago 51, Ill. Four page brochure describes and illustrates numerous applications of the company's leakproof air gun, in addition to complete specifications of the tool itself.

For more data circle 41 on Postpaid Card

Collet Stop Set

General Gauge Guild, 7570 San Fernando Rd., Sun Valley, Calif. Pamphlet describes and illustrates the company's collet stop set and the combinations possible with one universal collet stop set.

For more data circle 42 on Postpaid Card

Slitting Lines

E. W. Bliss Co., 1375 Raff Rd., Southwest, Canton 10, Ohio. Bulletin 44-A describes a complete line of slitting equipment for coils and sheet stock.

For more data circle 43 on Postpaid Card

Magnesium

The Dow Chemical Co., Midland, Mich. Booklet entitled "Magnesium in the Electronics Industry" describes the use of magnesium in airborne and air transportable electronics equipment.

For more data circle 44 on Postpaid Card

Metal Stampings

Dayton Rogers Manufacturing Co., Minneapolis 7D, Minn. This brochure illustrates typical examples of parts produced by the company. Included is cost data and some quick facts regarding Dayton Rogers capacity and material stocks.

For more data circle 45 on Postpaid Card

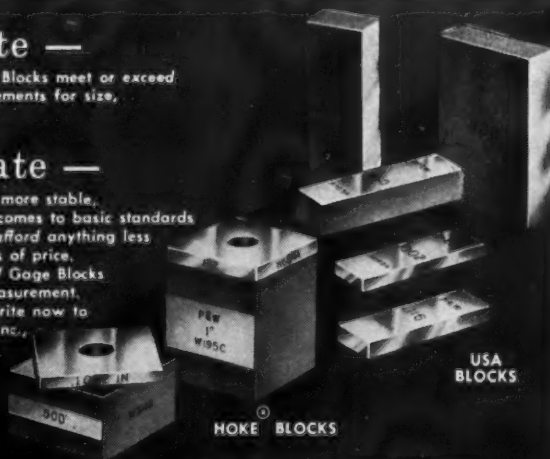
Are Accurate —

P&W HOKE and USA Gage Blocks meet or exceed Bureau of Standards requirements for size, flatness and parallelism.

Stay Accurate —

— because they are harder, more stable, resist wear better. When it comes to basic standards of measurement, you can't afford anything less than the best . . . regardless of price.

So make your selection P&W Gage Blocks and be sure of accurate measurement. For complete information, write now to Pratt & Whitney Company, Inc., 25 Charter Oak Boulevard, West Hartford, Conn.



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MACHINE TOOLS • GAGES • CUTTING TOOLS

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Produce
MORE
Holes... Accurately
Threaded

... because these taps ARE accurate
... with squares, shanks, threads, OD's and
threads all precision machined and ground on
centers. Correctly designed for fast, free cutting.
Heat treated for longer life. Write for complete in-
formation. Ask about the custom tap service P&W
offers you at no extra cost!

PRATT & WHITNEY TAPS
A COMPLETE RANGE OF TYPES AND SIZES IS AVAILABLE
FROM STOCK AT THE P & W BRANCH OFFICE NEAR YOU.

For more data circle 398 on Postpaid Card

free literature . . . (For free literature use postpaid card opposite inside back cover)

Gearshift Drive

The Lima Electric Motor Co., Inc., Department 144, Lima, Ohio. Eight page technical bulletin on the Lima Gearshift Drive. The bulletin describes the construction and typical applications of the drive.

For more data circle 46 on Postpaid Card

Hob Ground Milling Cutter

W. C. Chapman and Sons, Inc., 4705 Erdman Ave., Baltimore 5, Md. Four page bulletin describes and illustrates the Chapman Hob Ground Milling Cutters, which are claimed to cut twice the metal in half the time.

For more data circle 47 on Postpaid Card

Electric Furnaces

The Sentry Co., Foxboro, Mass. Twelve page color Bulletin No. 1054 concerns Sentry Electric Furnaces and the Diamond Block method of atmospheric control for hardening high speed steel.

For more data circle 48 on Postpaid Card

Tool Engineering

American Society of Tool Engineers, Department B, 10700 Puritan, Detroit 38, Mich. Booklet entitled "A Better Life Through Creative Manufacturing" is a transcript of remarks by Alex Drier given on the weekly program "America On The Go" over "Monitor."

For more data circle 49 on Postpaid Card

Turret Drilling Machine

Burgmaster Corp., 15001 South Figueroa St., Gardena, Calif. Four page bulletin tells how to reduce small diameter drilling and machining costs with the bench model Burgmaster Turret Drill.

For more data circle 50 on Postpaid Card

Cemented Carbide Cutting Tool Materials

General Electric Co., Metallurgical Products Department, Detroit 32, Mich. Catalog contains information about Carbobloy Cemented Carbide Cutting Tool Materials and a new pricing system for them.

For more data circle 51 on Postpaid Card

Piston Rod Deflections

Flick-Reedy Corp., Miller Fluid Power Division, 2024 North Hawthorne, Melrose Park, Ill. Handy table with descriptive information on eliminating piston rod deflections, was specially prepared for the use of engineers, designers and cylinder users.

For more data circle 52 on Postpaid Card

Screwless Vises

Heinrich Tools, Inc., Department 118-A, Racine, Wis. Four page, two color brochure gives complete specifications on ten models of screwless vises.

For more data circle 53 on Postpaid Card

Bench Shear

Whitney Metal Tool Co., 720 Forbes St., Rockford, Ill. Pamphlet describes and illustrates the Whitney-Jensen No. 39 Bench Shear.

For more data circle 54 on Postpaid Card

Indexing Device

The Hartford Special Machinery Co., 2758 Homestead Ave., Hartford 12, Conn. Four page folder illustrates the 24 inch Super Spacer indexing device, attachments and a complete parts breakdown and prices for component parts.

For more data circle 55 on Postpaid Card

Precision Spindles

The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio. Four page color bulletin entitled "Electrolytic Metal Removal" is a resume of current basic information.

For more data circle 56 on Postpaid Card

Pierce Nut Units

Wales-Strippit, Inc., 207 South Buell Rd., Akron, N. Y. This color catalog describes Strippit Pierce Nut Units for staking Fabriteel nuts into sheet metal for assembly panel production.

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Screw Thread Service

Standard Pressed Steel Co., Jenkintown 22, Pa. This 16 page handbook reviews both function and facilities of each of three new SPS Screw Thread Metrology Laboratories.

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Precision Honing Equipment

Sunnen Products Co., 7924-U Manchester Ave., St. Louis 17, Mo. Sixteen page case history booklet gives production rates, size, tolerance, stock removal and finish data on 99 widely diversified parts from $\frac{1}{4}$ inch to $2\frac{3}{4}$ inches inside diameter.

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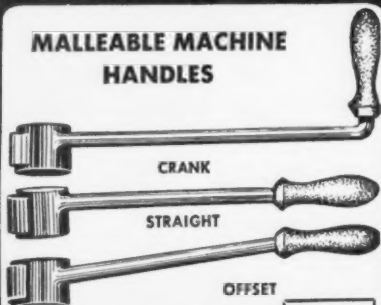
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Hydraulic Duplicating Attachment

Waterborg Machine Co., 2830 Rapids Drive, Racine, Wis. Four page brochure completely describes and illustrates the Waterborg Scan-O-Matic Hydraulic Duplicating Attachment.

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Miniature Threads and Tools

J. I. Morris Co., Southbridge, Mass. Catalog No. 98 contains dimensions, tables and other data on miniature threads between 56 and 160 per inch, as well as prices for stock taps, dies, screws and tools.

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Tool Steel

Uddeholm Company of America, Inc., 155 East 44th St., New York 17, N. Y. A new, expanded tool steel stock list—No. 13—is now available. Included in this list is a tool steel selector and properties guide.

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Finishing Internal Diameters

Industrial Tectonics, Inc., Ann Arbor, Mich. Catalog No. BZQ-11 describes the process of ballizing, which is a method for sizing and finishing holes by pressing a precision ball of suitable size and hardness through a hole.

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Sensitive Drilling Machine

Eldlund Machinery Co., 32 Huntington St., Cortland, N. Y. Eight page illustrated Bulletin No. 160R gives complete specifications on a high speed sensitive drilling machine, which is available in bench and pedestal models.

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Drilling and Tapping Heads

Chicago Quadrill Co., 1854 Busse Highway, Des Plaines, Ill. This four page bulletin describes the Quadrill Turret Head designed for drilling, reaming, countersinking and counterboring and the QuadTapper which has been designed for tapping operations.

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OVER THE EDITOR'S DESK . . .



HIGH STRENGTH METAL

Titanium sheet which will withstand upwards of 100 tons pressure per square inch is now available to aircraft manufacturers charged with the responsibility of building manned aircraft that will fly at 2,100 miles per hour. This type of aircraft is subjected to such tremendous pressure that air friction alone heats external parts to about 600 deg. F.

Success in producing the new titanium sheet is attributed to the development of a method of heat treatment, a research target which has eluded producers since this type of material was demanded by the airframe industry more than three years ago. In order to heat treat the sheet, a radical new furnace was developed in which titanium metal is heated to 1,600 deg. F. by means of a quick, powerful jolt of electric power. The red hot material is then immediately water quenched.

With tensile strengths averaging about 190,000 pounds per square inch, the new alloy is 50 percent stronger than the strongest titanium alloy of five years ago.

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METALWORKING MACHINERY

Metalworking machine shipments during the second quarter of 1958

approximated \$157 million compared with \$307 million for the same period of 1957, according to the Metalworking Equipment Division, Business and Defense Services Administration and the Bureau of the Census, United States Department of Commerce.

The shipments for this quarter include \$115 million of cutting type machines and \$42 million of forming and shaping types as compared with \$231 million and \$76 million, respectively, for the second quarter of 1957.

New orders for metalworking machines approximated \$104 million, reflecting a 42 percent decrease from the \$178 million total for the second quarter of 1957. New orders for the second quarter include \$76 million of cutting type machines and \$28 million of forming and shaping types as compared with \$141 million and \$37 million, respectively, for the second quarter of 1957.

The data for 1958 are industry totals based on reports submitted by approximately 355 companies including approximately 50 companies which were not covered for previous periods. These 355 companies account for about 95 percent of the total shipments of metalworking machines during the period April 1 through June 30, 1958.



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INFLATION'S TOLL

Inflation can be more damaging and destructive to a nation's people than war—even H-bomb war. This is a fact difficult for people to accept, and that makes inflation all the more dangerous; for unless people are frightened of the consequences of inflation they will take no effective action to halt it. Today in the United States, continuing "modest" inflation and the threat of wild, runaway inflation constitute one of the major dangers to our prosperity, our freedom and even to our survival.

There are many grim lessons in history on the destructive power of inflation. Despots have deliberately debauched the currency to gain dictatorial control over a nation's people; bloody revolutions have been brought on by conditions of wild inflation; and in nation after nation the value of monetary wealth has been wiped out by inflation, leaving a whole population prostrate. No condition could be of greater value to the Communist leaders plotting to conquer the world than runaway inflation in the United States.

The fact that since 1939 inflation has gradually eaten away 52 percent of the dollar's purchasing power should alarm and alert every American citizen; but unfortunately it hasn't.

It is vitally necessary for the

people of America to understand inflation, its principal causes and some of the more dramatic examples of its effects. It is vitally necessary for them to act intelligently to cope with this expanding danger. Inflation is caused by the existence of more money in the market place than there are goods to satisfy the demands. The over-abundance of dollars in ratio to goods cheapens the dollars; each dollar's purchasing power is reduced. Government spending, higher wages without bigger man-hour production, expanding public or private debt, and other related factors bring about the cheapening of money which is called inflation.

The individual stake in continuing inflation can perhaps best be understood by recalling what happened in Germany in the 1920's. At the advent of the Socialist controlled government in 1919, four and one-fifth German marks were equivalent in purchasing power to one dollar in American money. German inflation gathered momentum through 1919 and 1920, and began to run wild in 1922-23.

By July of 1923, 160,000 marks were required to equal a dollar's purchasing power.

By October, 1923, it required 242,000 marks to make a dollar.

By November 20, 1923, the mark was valued at 4,200,000,000,000 to the dollar. A newspaper in Berlin sold for 200 billion marks per copy. There was an actual case of a young German being left an inheritance of 650,000 marks in 1920 (worth \$65,000 at that time) with the provision that he would receive it at age 21. He became 21 in mid-1923. With

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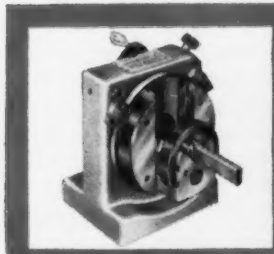
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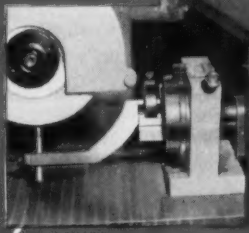
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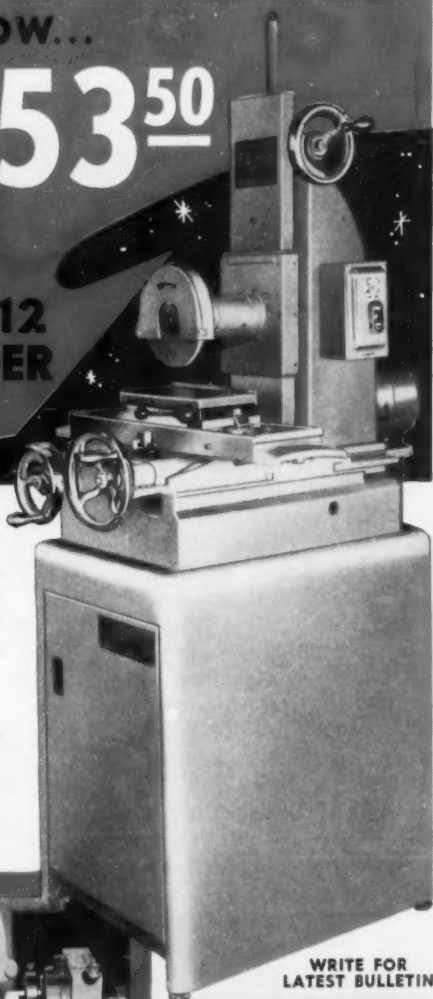
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modern machine shop 105



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his entire inheritance he was by then able to buy only one skimpy meal.

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READER INTEREST

I read with interest your article in the August issue entitled "Maintaining Numerically Controlled Machines." For those who are concerned with organizing a maintenance crew to service not only numerically controlled but any machine controlled by electronics, your article will shed much light.

Probably not subject for treatment in your magazine—yet it is one that must be dealt with—is how to design and package control circuitry so that maintenance crews can operate more effectively to keep equipment downtime to an absolute minimum.

One of the leading automobile manufacturers, who designs and builds their own balancing equipment, was faced with this problem. He had the choice of maintaining a costly crew of electronic nursemaids or he could design and package his controls so that once the trouble was located, the faulty unit could be replaced by a standby spare within thirty seconds.

He took the latter choice and utilized our plug-in chassis to house circuitry function-by-function in modular units. Warning devices and check points were strategically lo-

cated so that checks and adjustments could be made easily without tearing into equipment innards. These devices not only served as part of his preventive maintenance program but also were used to help isolate trouble quickly to a specific circuitry function so that from the first warning of trouble, the shortest amount of time would be taken to get the balancing equipment into operation again.

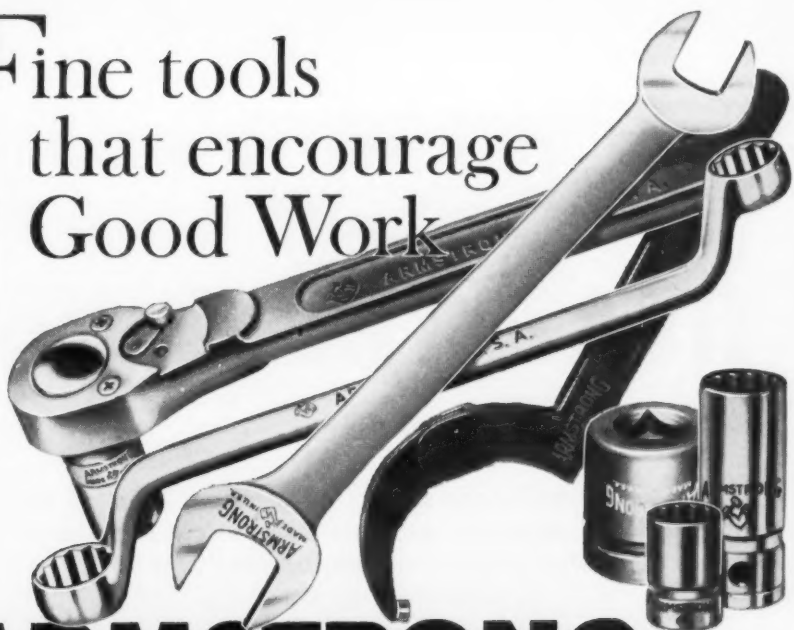
As faulty units were replaced on the spot, it was not the maintenance technician's job to repair them. His function was only to locate the source of trouble fast, make a replacement and get the machine operating again as quickly as possible. The faulty circuitry unit on its chassis was sent by the technician to a central service shop where repairs could be effected immediately but unhurriedly and then the unit returned to act as a standby spare.

At a quick glance, the cost of having standby spares may seem too high to be warranted. But it's an easy matter to compare the cost of standby spares against a highly paid maintenance crew of electronic technicians (plus a service group) and against tremendously high cost of "down-time" servicing.

Just as machinery replaced hands, so will industrial electronic controls virtually replace the thinking of machinery operators. But to be really practicable and economical — electronics in industry must be designed so that it is easy to install, operate, and *maintain*.

N. W. Hearn
Product Manager
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November, 1958

modern machine shop 107

An illustration of various US dollar bills and coins scattered around the title. Some bills are folded, some are flat, and several coins are shown. The money is depicted in a stylized, hand-drawn manner, with some bills showing the number '100' and others showing '50' or '20'. The coins are also drawn in a simple, illustrative style.

Practical

Pointers for Profitable

HEAT TREATING

The first installment of a series of articles on heat treating procedures, this discussion provides helpful tips for economically case hardening steel.

By A. S. EVES

Whenever you want to harden a particular steel, the question arises: Is it heat-treatable? That is, does it contain enough carbon so that when heated to the proper temperature and quenched it will become as hard as you'd like it to be?

A simple way to tell if a steel can be hardened successfully is to heat the end of a sample piece to a "cherry red" and quench it in water. If the end is so hard after cooling that you can't file it, you'll know the steel is heat-treatable, or "self-hardening."

But suppose the answer is, No—it does not contain enough carbon. What then can be done? It can be "case hardened."

Carbon can be *added to its sur-*

face. This is accomplished by heating the metal in contact with suitable molten salts, or a special compound, or some carbon-containing gas. These will supply carbon faster than the natural tendency of the carbon to leave the steel; the hot steel will pick up the excess carbon and absorb it. That makes it possible for the steel's surface to develop high hardness while the underlying metal retains its original toughness.

The depth of that absorption will depend upon: (a) temperature, (b) time at heat, and (c) the kind of carburizing agent. Also, when a compound is that agent, to some extent on humidity; for moisture then can slow the process. With modern

gas atmosphere furnaces this not only can be avoided, but one can even control the "concentration" (percentage) of carbon.

Now mark this carefully. If after carbon is diffused into its surface the steel is cooled slowly, it will remain soft. Were you to cut it apart and look at it, you would not see the extra carbon. But in a piece that is quenched speedily from the hardening temperature, a hard shell or "case" is produced. When the piece is cut, the two zones are apparent; the finer grain structure of the hard outer layer can be seen and tested. The iron carbide in the "carburized" (cased) surface gives this hardness.

Parts so surface-hardened wear well and also withstand severe impact, since their interior ("core") still is soft. How soft? Well, that depends on how much carbon was in the original steel.

Hardness of the case diminishes as it nears the core. Also, the carbon content grows less; the outer zone may have as much as 1.25 percent of carbon while a little deeper it is only 0.75 percent. Because of the "gradation," we speak of: (a) total case depth and (b) effective case depth, the latter being about three-fourths of the total. Thus, a case depth specified as 0.030 inch should have an actual depth of 0.040 inch, with some tolerance plus or minus. The tolerance ought to range from a couple of thousandths on shallow cases, to as much as 0.007 inch on a job involving $\frac{1}{8}$ -inch deep case.

When grinding must be done, one should never forget that the best-wearing part of the case is right on

top. The portion that will be ground off is the *best* part.

Case hardening isn't entirely simple. It calls for careful planning starting with such aims as wear, fatigue strength, and impact values. Hardness can vary, depending on whether cooling is done in water or brine, salts, or oil. The quenching is perhaps even more important for case hardening than it is for straight heat treating. The faster the steel cools, the harder will be the "case." However, it often is wise to sacrifice some hardness in order to gain strength and to reduce warpage.

Depths of hardness should be in accord with the needs of the user. For wear resistance alone, as little as 0.002 inch may suffice; but at least two or three times that amount of case will be necessary if any finish grinding is to be done. *Again, for high wear resistance and to resist crushing, the depth may have to be 1/32 inch or more, while ex-*



"A simple way to tell if steel can be hardened successfully is to heat the end of a piece to a 'cherry red' and quench it . . ."

**"... once the surface has been cased,
it is chemically the same as a tool steel . . ."**

treme jobs may require as much as $\frac{1}{4}$ inch.

Let's take a little closer look at the effect of the cooling rate. If you take a 1-inch cube of mild, low-carbon machine steel and give it an ordinary $\frac{1}{32}$ -inch deep case and then quench it into water or brine, its hardness probably will be 62 to 65 on the Rockwell C scale. But if you quench it in oil, the hardness will be considerably lower—maybe only 42 to 50 C. Certainly it will not be "file hard" (a frequent specification) which is another way of saying 60 C upward. Nevertheless, it is good to realize that even with an oil quench, a great deal of wear quality will have been added, perhaps four or five times as much as though the piece had been left soft.

Note that we spoke of an "ordinary" case. If we introduce nitro-

gen it will give a somewhat higher hardness to parts that are quenched in oil. So, too, will alloys added to the steel itself.

Are you wondering whether everything that is carburized must also be hardened? The answer is No, not if you prefer that the job remain soft. Perhaps you will want to do some machining before the final hardening; or you may wish to harden only certain selected areas. The quench can safely be avoided. Even though the parts have absorbed carbon, they will remain soft and can be hardened later on. In fact, they can be annealed and rehardened as often as desired, for once the surface has been cased, it is chemically the same as a tool steel and may be treated as such.

A shallow case may contain only 0.80 to 0.90 carbon; but after, say, an 8-hour "soak" in the carburizing medium, it not only is deeper and probably better for wear, but the carbon may actually run as high as 1.25 percent.

Methods

The common technique for case hardening carry different names, but these have come to mean somewhat less than they used to. For instance, shallow case hardening still often is referred to as "cyaniding" merely because that used to be the way most of it was done. Deeper penetrations of carbon are referred to rather loosely as "light casing," while still deeper cases ($\frac{1}{32}$ inch up) generally are spoken of as



"Parts so surfaced hardened will stand severe impact since their core still is soft."

"carburizing." However, the coming of prepared gas atmospheres and special furnaces for casing brought an overlap of meanings. It also brought us new terms such as "dry cyaniding" and "gas carburizing," while the addition of a little nitrogen turns these into what is known as "carbonitriding."

These names need not be too confusing. Just bear in mind that in every instance of case hardening the chemical content of the steel's surface is changed by absorbing carbonaceous gas.

Old timers used to heat steel, sprinkle it with powdered cyanide, and thrust it back into the furnace again. That resulted in a "skin" effect — hard but actually far from uniform. Nowadays we have all these different processes:

CYANIDING (in liquid). A very familiar term, but "liquid carburizing" would be equally correct. Steel is immersed in a bath of molten salts (approximately 25 percent cyanide) at temperatures of 1300 to 1500 deg. F. for a few minutes to an hour, depending on the depth of case desired. Mostly used for depths of 0.002 to 0.005 inch. The quenching medium may be water or brine, or a low-temperature salt bath, or oil. Incidentally, when steel so cyanided happens to be of the hot rolled type, it is apt to become pitted.

LIGHT CASING is also liquid carburizing. It carries a number of trade names, but is precisely like cyaniding in liquid except that the bath is more highly activated; hence, case depths are roughly 0.006 to 0.020 inch. A few baths can produce as much as 0.090 of an inch.

AEROCASING is technically liquid carburizing.

Generally the furnaces for bath casing are small round pots, and the charge is with small mesh baskets. Today's trend, however, is toward the use of gas atmospheres, in large mechanized (batch type, continuous, or rotary) furnaces.

The advantages of the little pot are (a) two or more jobs can be done at the same time, even where different case depths are wanted, merely by pulling out one job sooner than another; and (b) somewhat more speed.

In molten baths, low temperatures and low concentration of cyanide produce cases with lower carbon and higher nitrogen content. Nitriding needles in a case indicate somewhat greater hardness. You get shallower cases but better wear quality when nitrogen is present. Probably less distortion, too, due to lowered heat intensity.

Pieces quenched from a molten salt bath (or a molten bath of any



"... for high wear resistance, the depth may have to be 1/32 inch or more ..."

**"Really deep cases take considerable time—
50 to 90 hours for a 1/8-inch job . . ."**

kind) are rarely rough or scaly on the surface. The same can be said of some—though not all—gas carburizing procedures.

An interesting application of salt bath carburizing is to combine it with the brazing together of sub-assemblies, doing both the case hardening and brazing in one shot.

NOTE: Just because you hear someone mention "salt bath hardening," don't conclude that he must mean case hardening. Instead he might mean the use of neutral (non-carburizing) salts for straight heat treating, just to avoid dirt and scale.

So much for the liquid baths; now we come to:

CARBURIZING (pack) . . . oldest hardening process known to man. The steel is sealed in heat-resisting boxes or pots, each piece surrounded by an inch or more of a charcoal-like compound. Early ironsmiths used bone, dried blood, or charred leather.

Most pack carburizing is done to depths of 1/32 to 1/16 inch. Some jobs, however, demand twice that penetration, while a few need as much as 0.080 to 0.250 inch.

The period of time (at heat) is very important. Carburizing begins with great velocity: at 1700 deg. F. carbon is absorbed at roughly 0.005 inch per hour, but progress slows markedly as the depth increases. It takes about 4 hours to get 0.030 to 0.050 inch, maybe longer. Really deep cases do take considerable time—50 to 90 hours

for a 1/8-inch job, depending on size, shape, and other variables.

Several techniques are used, but all involve quenching the steel to harden the surface layer that holds the extra carbon. Simplest is to quench direct from the pot; this hardens the case and the core too insofar as it may be self-hardening. The pieces turn black, but are free from scale.

More common practice is to cool the parts slowly in the box or pot, then reheat and quench them. This provides a better case structure. The surface will show some oxidizing or scale, which is removed later by sand or grit blasting.

"Double treating" means to reheat after slow cooling, then to quench. This refines the core as well as the case, and makes for greater strength. However, such treatment is on the way out because



" . . . furnaces for bath casing are small round pots, and charge is with mesh baskets."

with present costs it is cheaper to use an alloy steel and a less complicated treatment.

CARBURIZING (rotary). Same principle, but the furnace is mechanized. It has a drum in which work is heated and gently tumbled so the parts do not "nest" and can pick up the carbon uniformly. Older models used loose compound, but new rotaries use a prepared gas atmosphere; so by adding nitrogen "carbonitriding" can be done.

CARBONITRIDING is gas carburizing. Usually done in either a continuous or what is known as a mechanized batch type furnace—a sort of compromise between a stationary furnace and a continuous one. Because of the gas atmosphere, the process gets other names such as "dry cyaniding," "gas cyaniding," and "nicarb."

The presence of nitrogen (usually from cracked ammonia) makes practically all the difference between a carburized and a carbonitrided case. *Since nitrogen steps up hard-*

ness, mild steel becomes file hard even when it is quenched in oil.

Go back and read that last sentence again. It may save you money! For unless certain alloys are needed for extra core properties, it may be at times that you can substitute plain carbon steels (SAE 1020, for example) for some more expensive, tougher-machining metal.

The newer case hardening devices offer several other advantages worth noting, as follows:

1. Ordinarily bars of any kind of steel from a mill have a soft surface from which the carbon vanished during the rolling process. They are said to be "decarburized." In the past, much of such steel was bought oversize in order that this soft skin could be machined off. But modern techniques permit the heat treater to restore this lost carbon. That may save the time and cost of machining, and help to reduce the more than 15 million tons of metal that Americans convert into chips every year.
2. Work comes out of these newer furnaces so clean that often the grinding formerly done after heat treatment now can be eliminated.
3. Warpage is reduced, because the temperatures for carbonitriding are somewhat lower than for ordinary carburizing—also the temperature of the oil in the built-in quench tanks can be regulated up or down. That helps too.
4. Many parts can be *stacked* in the containers before treatment, so they will automatically be quenched vertically or any way you wish. This also helps to keep them from going out of shape.

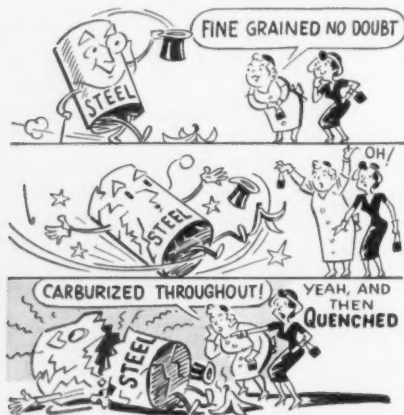


"Since nitrogen steps up hardness, mild steel becomes file hard when quenched . . ."

"A job that has been over-cased is next to impossible to correct."

5. The parts aren't dumped while hot, but remain in the containers during the quench. This avoids distortion and nicks.
6. The lower temperatures used spell less grain growth, with consequently increased strength.
7. It is possible to raise the carbon content of a medium carbon steel, at least on its surface.
8. Or, one can turn low carbon steels of light section into medium or high carbon steels by casing them clear through. That is what is called "homogeneous" carburizing, a long-hair word that simply means "the same all the way through." Years ago cream in the morning milk would rise to the top; now it stays evenly mixed because milk is homogenized.

Now it stands to reason that if one can carburize at all, one may carburize clear through—provided



"If you case too deep, you'll be in trouble, for hardened case is brittle as an eggshell."

the piece isn't too thick. For the carbon enters the steel from all sides (unless prevented) and meets in the middle. The core disappears. The structure, when the steel is quenched, takes on a fine-grain appearance throughout. That can be a blessing—or a threat.

More often than not, if you case an object too deep, you'll be in trouble, for a hardened case is as brittle as an eggshell. Ductility demands a soft core. In fact, an expert heat treater will always look first at the thinnest section and say to himself: "For strength, I must leave at least twice as much core as there is case." He may even refuse to harden a job to the depth specified if he thinks a weak portion might later crack either in heat treating or in service.

No matter what method is used to case steel, the parts will be slightly harder at the edges than elsewhere. Can you see why? Right you are—the carbon enters the steel from two or more sides, so there is a greater concentration of carbides at rims and edges.

A job that has been over-cased is next to impossible to correct. We did read of one instance where the case depth specified was 0.020 inch and by mistake it was carburized 0.035 inch. Using a gas designed deliberately to decarburize, an expert removed the case in two directions—toward the center and toward the surface. True, the core became a little higher in carbon than it was originally, but not damagingly so. The job then was done over,

this time correctly. We hold no brief for this sort of thing, however, and trust you may never have to try it.

On the other hand, the ability to case a piece clear through may be turned to very good account. Especially now that we have gas carburizing furnaces which let us control both the depth and amount of carbon in the case. This last is done by controlling the "dewpoint" (mixture of gas) in the heating chamber; if it is limited to 0.90 percent or 0.60 percent or even as little as 0.40 percent of carbon, naturally that's all the steel can pick up.

Such control can save plenty of money. For example, a manufacturer wishing to lower costs, or who happens to be having trouble with sharp bends in formed springs and the like, may be able to convert an inexpensive, easy-working steel into one of a higher carbon variety, after the parts have been made. That combines the economy of low-carbon material with the mechanical qualities of that higher-carbon steel! In fact, this sort of thing now is being done.

Following such treatment, the parts usually are martempered. This consists of quenching them in hot oil or molten salts and then cooling in air at room temperature.

You may have heard that steels suitable for case hardening are especially apt to distort, both dimensionally and by twisting out of shape. That to some extent is true.

The heat treater does expect some "movement" when carburizing the low carbon grades, more so than when he's heat treating tools. This has to do with things like size, shape, composition, grain size, mill-

rolling strains, machining and other cold-working stresses, depths of case, temperatures used, and the rate of cooling. Quite an array of factors.

Movement usually is less when the case needed is shallow; also when low heats can be used and if enough hardness can be obtained by quenching in hot oil or molten salts. (Plain carbon steels nearly always had to be quenched in water till the coming of carbonitriding; now file hardness can be had with an oil quench.)

Use of an alloy steel, say SAE 8620 instead of 1020, can be helpful in avoiding troublesome warp-age. It gives higher hardness, too.

In straightening, any danger of breakage is virtually wiped out by the existence of a soft, ductile core. Medium or high carbon steels are more hazardous because they must be straightened after they are hardened all the way through.

(To be continued in next month's issue)



"The heat treater does expect some 'movement' when carburizing low carbon grades."

The Machine Shop In E

The vital importance of a precision machine shop in turning out electronic components is stressed.

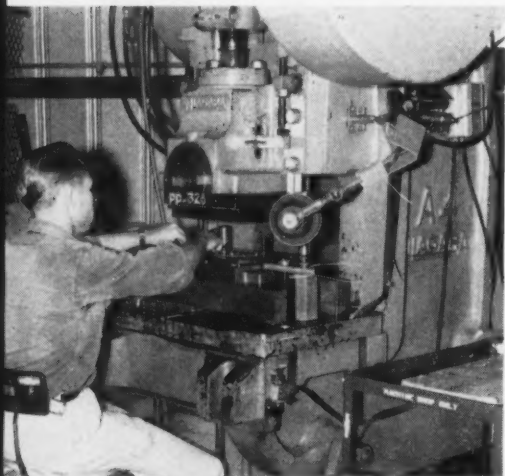
By R. E. SALRIN

Chief Production Engineer, Lear Incorporated,
Santa Monica, California

Speak of electronics production to the average shop technician not thoroughly versed in electronics production and he instantly builds a mental picture of long rows of assembly benches heaped high with wire in rolls, wire in bundles, vacuum tubes of all shapes, sizes and patterns, stacks of transformers with their wires protruding like octopus legs in every direction, and multitudinous

small boxes filled with resistors, transistors, capacitors, crystal diodes, selenium rectifiers and miscellaneous small hardware. This mental picture may even extend to include the screen room with rows of shelved and mysterious-looking instruments which will measure a millionth of a volt, a millionth of an ampere, or a million ohms and draw an extremely accurate picture of these quantities on an oscilloscope screen. But this mental panorama conjured by the inexperienced will seldom include a vital part of most electronics production facilities. This is the precision machine shop which in many cases is literally the backbone of the production operation. For it is in this machine shop that the "stages," so to speak, on which the electronic components will be mounted to perform during their service life, are turned out. These "stages" include a great variety of chassis parts, chassis shelving, chassis brackets, shafts, bushings, spacers, and in many cases the basic printed circuits which are becoming standard in many complex electronic assemblies.

The precision machine shop at the Learcal Division of Lear Incorporated, Santa Monica, California, may be taken as representa-



Specially tooled presses are used extensively in the production of chassis components. Here a chassis part is being pierced with a number of odd-shaped holes used for mounting of external electronic components.

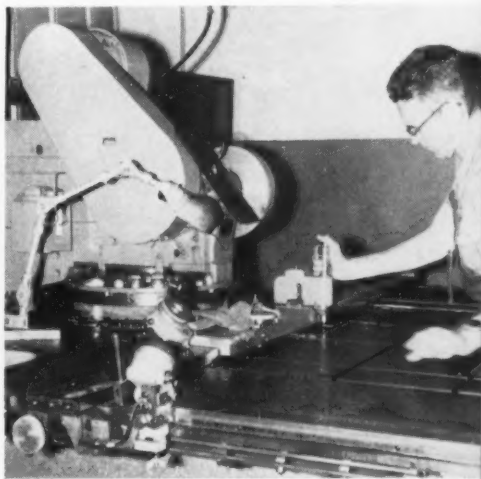
In Electronic Parts Production

tive of the machine shop facilities required in most complex electronic production operations. Lear is one of the nation's major producers of electronic controls for civilian aircraft and for military airplanes and missiles. These products include a variety of automatic direction finders, automatic flight control systems, VHF and Low Frequency navigation systems, automatic bombing systems, remote positioning and control systems, and even a multiple gyro system which, in combination with electronics, provides a stable space platform using only a star as reference. Needless to say, these are all very high precision products, with human life often dependent on their consistent and accurate operation. In instruments like these, the machine shop-produced mechanical components on which the electronic components are mounted, and which protects these components from vibration, shock, external injury, and often adverse weather conditions, attain equal importance with the electronic components themselves.

At Lear, the ratio between machine shop employees and all the rest of the employees needed to complete the electronic production operations, is about 1 to 3, or more specifically, 25 percent of all the production employees are engaged in machine shop work. Normally, about 65 employees work in our 15,000 square foot shop area to man and operate the machines and equipment listed in the accompany-

ing table. As will be noted, some of these machines are highly specialized; others are conventional machines but more often than not these conventional machines are equipped with complex tooling. This is especially true of the types of presses which are used to blank, pierce, and form chassis parts, and the single-spindle drills and punches that are used in prototype work.

In the electronics production work accomplished at Lear, our longest production run would be considered a very short run indeed in the automotive industry. However, within the scope of our production runs, we still divide them



This turret punch press is used for hole piercing on medium production runs. Template for press is prepared on jig borer. Longer production runs are pierced by punch die. On very long runs, progressive dies may be used.

Electronics Production . . .

into prototype work, short runs, medium runs and long runs. This helps in scheduling the work through the shop and to the machines where it can be accomplished most expeditiously.

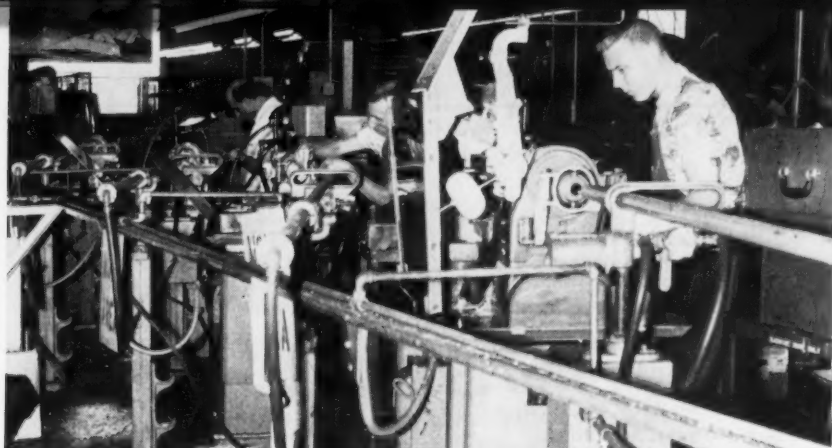
Lear designs all of its own tooling, but most of the tools are produced by outside tooling shops. Our own toolroom is used mostly for rush jobs and tool maintenance. Needless to say, the major portion of our tooling expenditure is on press tools. The press with its special tools is used for piercing and blanking a great variety of chassis parts, for forming the parts into chassis component shape, and for piercing and forming the numerous shelves and brackets which are ul-

timately spot welded into the chassis assembly. A few progressive dies are used for blanking, piercing, and forming some chassis components, but the average production run will not justify the cost of a complex progressive die. For this reason, numerous single-operation tools are necessary, both in press work and for piercing the numerous odd-shaped holes and cut-outs in the chassis assemblies.

The two automatic screw machines in our main shop are used largely for producing spacers, stand-offs, bushings, shafts, and so on. Most such parts are produced from stainless steel, aluminum or cold rolled steel, and the tolerances in many cases must fall within 0.0005 inch. The several banks of single and multiple-spindle drill presses are used for chassis component drilling on prototypes and short run work. Here again very close drilling tolerances must be held, with the average tolerance being about 0.005 inch on hole centers, and on critical parts running downward to 0.001 inch on centers. Our mills are used for producing the more rigid chassis components and in some cases frame components for electronic assemblies which demand rigid support or mounting facilities. While 75ST aluminum alloy is the metal most commonly used, occasions arise when practically all types of metal alloys must be machined. This necessitates great versatility in all tools and holding fixtures. In fact, it might be said that versatility is a major requirement for any machine shop that is currently engaged in electronic production work.



Drill head used for drilling 0.067-inch diameter eyeletting holes in circuit boards.



Four of the five screw machines used in the Lear shop. Shafts, bushings, spacers, and so on, are turned out on these screw machines. Tolerances are often held within tenths.

As already indicated, we have some very specialized equipment in the Learcal shop. One such piece of equipment is the Wiedemann turret punch press used for short run sheet metal piercing work. The various stations on the Wiedemann turret are set up with punches of various sizes and shapes, then a Wiedemann color-coded template produced on a Hauser jig borer is used by the operator in the punching operation. While the Wiedemann is very handy for short or medium short production runs, we usually go to a piercing type of die on long run work, or back up to the single spindle punch or drill on prototype work.

Another very specialized piece of equipment is the 300 spindle Zagar drill head used for drilling the small holes in the blanked copper-clad epoxy glass material used for our printed electronic circuits. In a single operation, the Zagar drill head can drill up to 300 holes and in any hole pattern desired in one of these printed circuit blanks. But here again the Zagar must be

considered as a tool for intermediate production. It is not as fast as a special piercing die used to punch a specific hole pattern in mass produced parts. In all cases, these small holes in the printed circuit base are eyelet holes. An American Shoe automatic eyeletting machine is used to install metal eyelets in each hole which serve to connect circuits which are etched on opposite sides of the base, and the hole through the center of the eyelet is used for mounting the lead wires from external electronic components. The lead wires are inserted through the eyelet holes and are then soldered properly in place.

As already mentioned, our tool-room is used mostly for rush jobs and for tool maintenance work. However, this does not minimize its importance. The variety of tools employed and the requirements for critical tolerances makes tool maintenance a very important function. As indicated in the table, the tool-room includes a Hauser jig borer installed in an air-conditioned room

Machine Shop

- 3 Hardinge Chuckers
- 4 Hardinge Turret Lathes
- 2 No. 3 Warner and Swasey Turret Lathes
- 1 No. 0 Brown and Sharpe Automatic Screw Machine
- 1 No. 2G Brown and Sharpe Automatic Screw Machine
- 2 Nichols Hand Mills
- 2 No. 2 Brown and Sharpe Horizontal Mills
- 2 No. 40 Index Vertical Mills
- 2 No. 2 Brown and Sharpe Vertical Mills
- 1 Bank of 6 Spindles, Buffalo Drill Press
- 2 Banks of Allen Drill Presses
- 1 Bank of Leland-Gifford Drill Presses
- 2 Banks of 4 Spindles, 17 Inch Delta Drill Presses
- 1 Allen Tapper
- 1 Floor Model, 17 Inch Delta Drill Press with Boyar-Schultz Lead Screw Tapping Attachments
- 1 Floor Model, 17 Inch Delta Drill Press with Air Feed and 8 Spindle Multiple Head
- 1 No. 10 Warner and Swasey Lead Screw Tapper
- 1 Snow Air-Operated Automatic Tapper

Tool Room

- 1 3BA Hauser Jig Borer (located in an air conditioned room)
- 1 Linley Jig Borer
- 1 Leland-Gifford Drill Press
- 1 Buffalo Drill Press
- 1 14 Inch Delta Drill Press
- 1 DoAll Hydraulic Surface Grinder
- 2 Hammond Surface Grinders
- 1 No. 5 Brown and Sharpe Cylindrical Grinder
- 1 Ex-Cell-O Carbide Tool Grinder
- 3 South Bend 13 Inch Engine Lathes
- 1 Hardinge Tool Room Lathe
- 1 Queen City Shaper

Tool Room (Cont'd)

- 1 No. 2 Brown and Sharpe Horizontal Mill
- 2 No. 40 Index Vertical Mills
- 1 Rosenfors Vertical Mill
- 1 Electric Heat Treat Furnace
- 1 Oliver Die Filer
- Miscellaneous Pedestal Tool Grinders

Sheet Metal Shop

- 1 Model RA14P Wiedemann Turret Rotary Punch
- 1 No. 4 Niagara 90 Ton Punch Press
- 1 No. 3½ Niagara 60 Ton Punch Press
- 1 Federal 45 Ton Punch Press
- 1 Highland 20 Ton Punch Press
- 2 Benchmaster 4 Ton Punch Presses
- 1 Hannifin Hydraulic 10 Ton Press
- 1 Sciaky 75 KVA Spotwelder (Certified)
- 1 Dillon Pull Tester
- 1 Surface Analyzer
- 1 Pexto Shear
- 1 Di-Acro Shear
- 1 Verson 54 Inch Power Brake, 45 Tons
- 1 Di-Acro Hydraulic Brake
- 1 Erco Shrinker
- Miscellaneous Belt and Disc Sanders

Printed Circuit Department

- 1 Master Etcher
 - 1 Adjustable 300 Spindle Zagar Drill Head for drilling printed circuits (completely air operated)
 - 1 Eyeletting Machine
 - 1 Electronic Products Automatic Dip Soldering Machine
- (Necessary fabrication and plating equipment for production of printed circuit boards are called out in other locations.)

Table listing tooling used in the various sections of the Lear Incorporated machine shop for the purpose of turning out complex electronic products or assemblies.

and used for highly critical work, a Linley jig borer used for somewhat less critical work, a small electric heat treat furnace used for heat treating tool components as required, and a variety of other tools common to most tooling shops.

The rack of raw stock shown in one of the accompanying illustrations is perhaps more expressive than words concerning the variety of jobs that must be accomplished in a machine shop engaged in electronic production. And this raw stock does not include any of the many varieties of sheet metal used to produce chassis components, nor does it include the epoxy glass material used for producing the more than 50 printed circuits which go into the Lear electronic assemblies. We have touched rather lightly on the production of these printed circuits because, aside from the blanking, piercing, eyeletting, and soldering of these circuits, production is largely a series of chemical and plating operations.

To summarize briefly, electronics production work and the manufacture of electronic products in all categories is now on the upswing and from current indications will continue this trend into the distant future. The purpose of this article was to point out to those who are not now, but who soon may be engaged in electronics production work, the vital importance of a precision machine shop in this type of work. In fact, the ratio of machine shop employees to assembly line employees is much narrower in electronics production than in many other types of industry. Most quality electronic products which

are produced today, and which will be produced in the future, are individually designed assemblies rather than an assembly of purchased parts. While the basic electronic components themselves, such as vacuum tubes, resistors, transistors, and so on, are and will continue to be purchased parts, the chassis components, frames, platforms, brackets, and so on, in or on which these components are mounted will be a company design and produced in the company's own shops.

Any of the thousands of smaller companies who in the next few years will make the swing to electronics production work should bear this fact firmly in mind when planning the various machine shop facilities they will require for such work.



Raw stock storage rack in Learcal shop. Variety of shapes indicates variety of work done.

X-Ray and Gamma-Ray Units Produce Permanent Records

Combination of X-Ray and Gamma-Ray permits high pressure valves and castings to be inspected eight times faster.

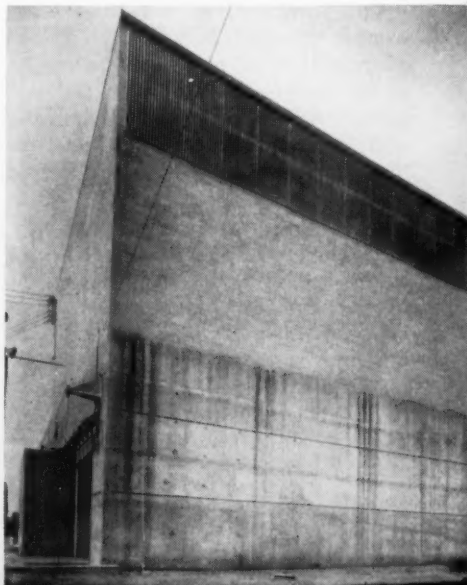
Normally, when we think about radiographic inspection for non-destructive testing, we include such methods as X-Ray, Gamma-Ray and other combinations or apparatus. Basically, radiographic inspection involves the passage of rays through materials to be tested. These rays impinge themselves on a film or screen to reveal and permanently record the internal structure of the test object. The permanent records are invaluable to the metal industry for they, in the long run, reduce manufacturing costs and, at the same time, assure customers of quality in structure and finished parts.

"When the ACCO Steel Casting Division and the R-P&C Valve Division, American Chain & Cable Company, Inc., Reading, Pa., put

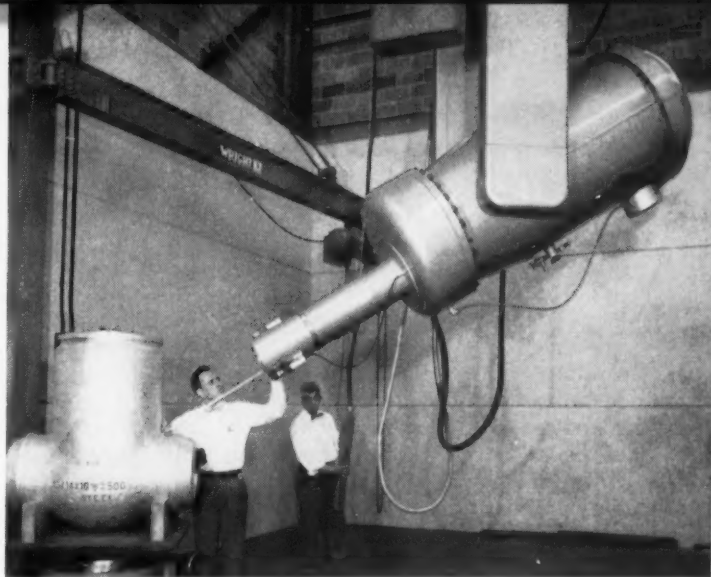
their two newest units for non-destructive testing purposes 'on stream,' they will be able to inspect high pressure valves and castings at an accelerated rate, more than eight times faster than previous methods," stated Mr. C. N. Johns, president. "The combination of our new 2 million electron volt Van de Graaff radiographic X-Ray generator and a 10 Curie Source of Cobalt 60, believed to be among the first of such installations in the metal industry for non-destructive testing purposes, will assure our customers

▲

Specially designed and constructed to comply with AEC, City and State codes of safety and health, this new building was erected on a tract of land adjacent to the main mill and foundry of the ACCO Steel Casting and R-P&C Valve Divisions, American Chain & Cable Company, Inc., Reading, Pa. The structure, with its high density concrete walls, measuring 48 inches in thickness for the section housing the X-Ray generator and 24 inches in thickness for that enclosing the Gamma-Ray source of Cobalt 60, is capable of absorbing all emitted radiation generated during radiographic, non-destructive testing exposures. Note the solid and massive door at left.



The casting is in place and is ready for radiographic inspection. Bob Miller is measuring the exact focal distance from the tube's extremity to the casting body. Paul Connolly, at the control box for the Wright bridge crane, inches the generator tube into position. All castings are X-Rayed with a fixed focal distance of 36 inches. This casting, with a 7-inch wall, will require that the tube be exactly 29 inches away from the steel shell for the correct exposure.



of complete satisfaction in finished products."

It is generally known that X-Rays have wave lengths ranging from 1/10,000 to 1/10,000,000 that of light which is visible. These rays are activated by transformers with capacities of a few thousand to several million electron volts. The extreme shortness of the waves, or rays, allows them to penetrate opaque materials of high densities. The number of rays that pass through the material and impinge themselves on a film depends on the voltage that is applied to the X-Ray accelerator tube and to the current flowing through it.

With high productivity in mind, ACCO officials decided to acquire, from High Voltage Engineering Corporation, a 2-million electron-volt electrostatic radiographic generator and to materially increase the productive output of their existing radiographic facilities. In the case of the generator,

X-Ray waves are produced when electrons, which are traveling at high rates of speed, strike matter. This is true of all such generators. The accelerator tube's incandescent filament supplies the electrons and forms the cathode, the negative electrode. The high voltage which is applied to the tube drives these electrons to the anode, or target. Sudden stoppage of these electrons at or near the tube's target surface results in the generation of X-Rays.

A radiograph, therefore, is the photographic record produced by X-Rays or Gamma-Rays which have passed through an object onto a film. When this film is exposed to the ultra short wave lengths of the X-Ray or Gamma-Rays, an invisible change is produced in the film's emulsion. Exposed areas become dark when the film is developed. These shadows represent the defective areas.

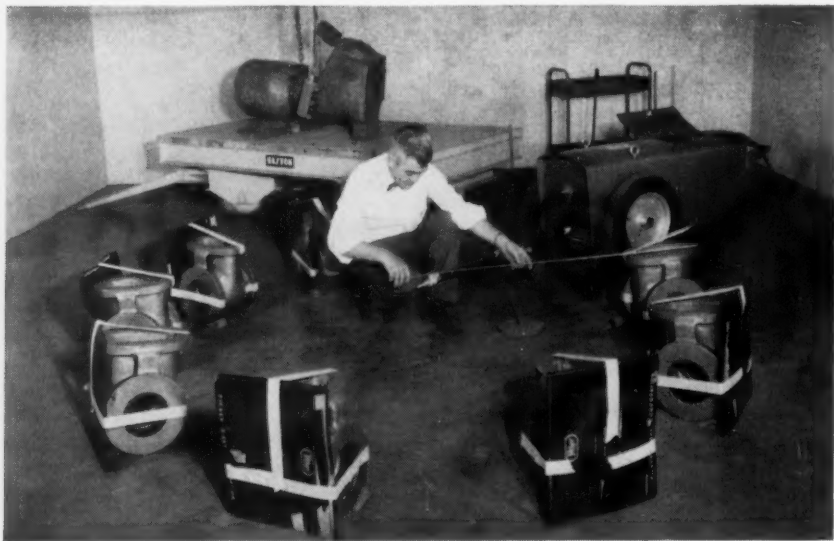
For example, the ACCO Steel Casting Division wants to inspect

"... this void reduces the total thickness of the steel to be penetrated ..."

one of their steel castings. Should it have a void, this void reduces the total thickness of the steel to be penetrated. Therefore, more radiation passes through the section containing the void than through surrounding areas. Dark spots, corresponding to the projected position of the void, appear on the film when it is developed. Consequently, a radiograph is essentially a shallow picture with the darker regions on the film showing up as the more penetrable areas in the object cast-

ing and the lighter regions as the more opaque or solid sections.

X-Ray units may be fixed or mobile, depending on design. The new 2-million electron volt generator installed in Reading is of the fixed type as the material to be radiographed is portable. The unit's accelerator tube is mounted in a pressurized tank which is suspended from a specially designed bridge crane, allowing complete freedom of movement. Castings and high pressure valve components may be



Here, Paul Connolly measures the exact distance from the long tube to the 6-inch flange and gate bodies. For best results, it was determined that these steel shells be spotted exactly 50 inches away from the source of Cobalt 60 during the exposure period. All

eight castings, in the 360 degree circle, will be radiographed simultaneously using 14 x 17 inch type AA film. The source of Cobalt 60, when not in use, is shielded in its own 850 pound lead container, which is shown at the upper right in the illustration.

“ . . . Gamma-Ray units require no power source, are extremely light and require little or no maintenance . . . ”

arranged in any pattern to suit the needs of the operator as he makes his non-destructive tests.

By the same token, the 10 Curie source of Cobalt 60 is portable, being contained in a specially designed lead container—850 pounds of lead for shielding—which can be moved about in the radiation chamber. Being portable it can be moved about with ease before or after the huge castings are gamma-rayed in successive stages.

Isotope radiography, at American Chain & Cable Company, Inc., is not replacing high voltage X-Ray equipment. It is complementary to and is aiding ACCO's inspection program by taking on those jobs where a grouping of castings of similar construction can be shot at one time.

Compared with X-Ray equipment doing a comparable job, Gamma-Ray units require no power source, are extremely light and require little or no maintenance during the life of the isotope. They are better suited for thin sections of metal, while X-Ray is much better for the heavy sections.

Gamma-Rays are similar in their characteristics to X-Rays. They show the same similarities to and differences from visible lights as do the X-Rays. Gamma-Rays are emitted from the disintegrating nuclei of the radioactive Cobalt 60 (or other radioactive materials).

Radiation quality of the Gamma-Ray source is determined by the



In the separately maintained film viewing room, a vital part of the complete radiographic inspection facilities, Herman Giudici, assistant chief metallurgist for the ACCO Steel Castings and R-P&C Valve Divisions, is inspecting two sheets of exposed film for flaws. The viewer is foot-treadle operated for lighting up the background, freeing hands to mark defects.

strength of the source and is not variable at the operator's will. Having great penetrating power, ACCO's source of Cobalt 60—10 Curies—can be used to radiograph steel sections of miscellaneous castings and pressure vessels as thick as 6 inches in 2 hours elapsed time, with an 18-inch focal distance. Their source of Cobalt 60 will gradually lose activity with the passage of time. In a period of five years, the 10 Curie source will have the effect of a 5 Curie installation. On the other hand, radium will only lose half of its power or intensity over a period of 1600 years.



Walker Machinery Holds—

Machine Tool Exhibit

This is the story of one man's answer to the recession. It is neither unique nor startlingly different. Rather it is typical of what American businessmen are doing while the government planners are still trying to figure out what to do.

As with everyone else, business in May and June was bad for the Walker Machinery Co., Cincinnati. To be sure the fall upturn was due but something better than the annual increase in business was needed. Bill Walker called his assistants in and they "kicked the problem around." The answer, they thought, might be to hold a showing of their own.

Invitations were sent to everyone

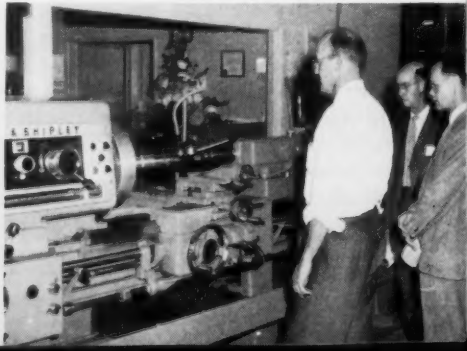
on their mailing list in their business area. The show was scheduled for three days, from two till eight in the evening, with a buffet at dinner-time. Manufacturers represented by the company were invited to supply operators and representatives for the machines to be pulled out of Walker stock.

Results were satisfactory. The showing pulled the people desired from further distances than had been anticipated. The 3,500 square feet of floor space was quickly filled up and the show spilled over outside. At a total cost of about \$5,000 the machine tool show gathered many leads, some orders and sold three machines directly off the floor.

Staff of the Walker Machinery Co. checks last minute arrangements. Shown left to right are: Bill Walker, president; Roger Stultz, Ron Uhls, B. F. Bain and Art Enwright, Sales Engineers; Ruth Nacke, secretary-treasurer and Nancy Chalton, secretary are seated.



Visitors from Wright-Patterson Air Force Base watch Bill Lindsley (left) of the Lodge and Shipley Company demonstrate its 16-inch Powerturn Lathe. Using a cemented ceramic tool on 1045 steel he is cutting at the rate of 3,000 s.f.p.m. with a 0.200 inch cut.

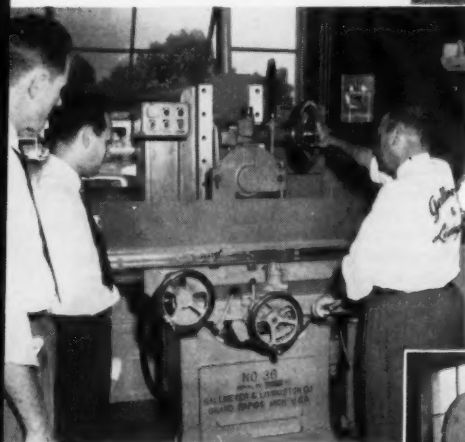
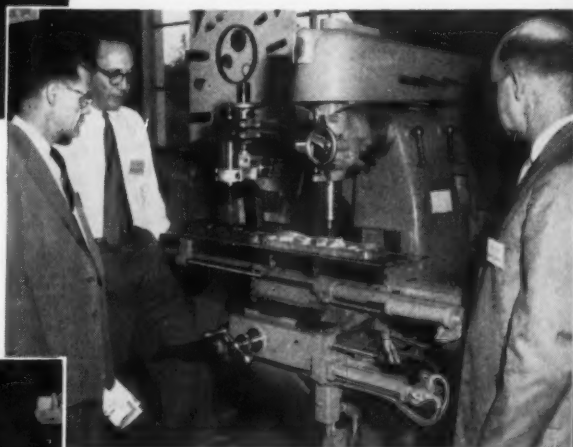


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Left: (Left to right) Ed Black, Miami Industries; Joe Dobriek, president, Spitfire Tool Co.; E. J. Luhn, Goodyear Atomic Corporation and Sam Jackson, Miami Industries observe the operation of the Spitfire Gyromatic "12" Lapping Machine which, incidentally, was the smallest machine shown at the exhibit.

Right: L. C. Fryman (right) and Thomas Burch (left) of Wright-Patterson A.F.B. watch as the operation of a hydraulic tracer is explained to them by Charles Straus, president, U. S. Burke Machine Tool Division. The design is being cut in a piece of aluminum stock.



Left: Hilton Thieme (right) simultaneously operates this Gallmeyer and Livingston No. 36 Hydraulic Feed Surface Grinder and explains its advantages to Rudolph Rogers (left) and Clifton Musser of the Schiable Plant of the American Radiator Corporation. Using a high-carbon high-chrome steel blank he is grinding to 10 microinches within 0.0002 inch with an all-purpose wheel.

Right: (Left to right) Gilbert Melick, United Shoe Machinery Co., Rick Crema, Armstrong-Blum Manufacturing Co., Wayne Hickman, United Shoe Machinery Co., Ron Uhls, Walker Machinery Co. and James Miller, Ohio Laboratories view the Armstrong-Blum "Marvel" Hack Saw No. 9. Behind them is the "Marvel" No. 8 Bandsaw.





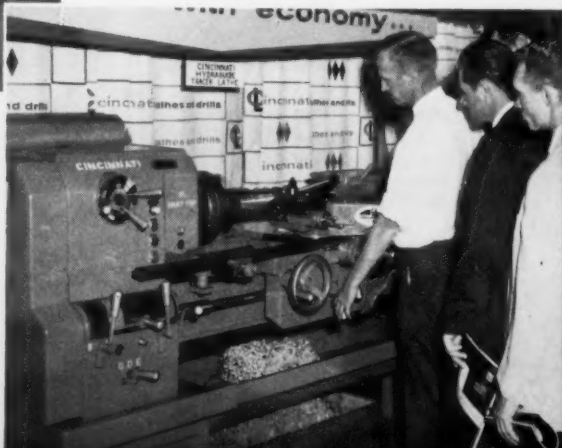
Left: Lee Johnson, Anocut Engineering Company (left) demonstrates an electrolytic grinder to Gregor Kreidler of Allis-Chalmers Manufacturing Company. The electrolytic grinder is made especially for efficiently grinding carbide and various other tough-to-grind materials to within very precise tolerances.

Right: Charles Gilbert, vice president and treasurer of the Cincinnati Gilbert Machine Tool Co. demonstrates one of the company's radial drills to Sam Jackson (right) and J. E. Black of Miami Industries. This model has a 9-inch-column and a 3-foot arm. The casting shown is made of semisteel.

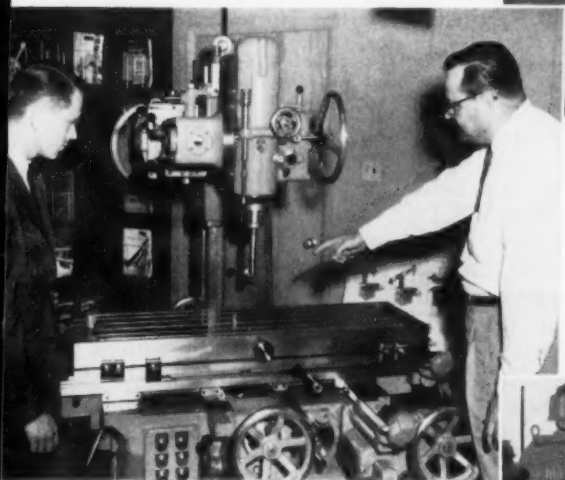


Left: Jay Minnich (right) United Shoe Machinery Co. watches as Howard Classen, Howe and Fant, Inc., demonstrates a Model A Turret Drill Press. Six tools are drilling 16 holes in nine hole locations in less than a minute. An unusually interesting feature of this drill press is the universal positioning table.

Right: A 15 Tray Top Cincinnati Hydraguide Tracer Lathe manufactured by the Cincinnati Lathe and Tool Co. is demonstrated as an interested group from Lafayette Vocational School, Lexington, Kentucky looks on. The evident interest they show is typical of that evinced by all the visitors as they moved about the machine tool show.

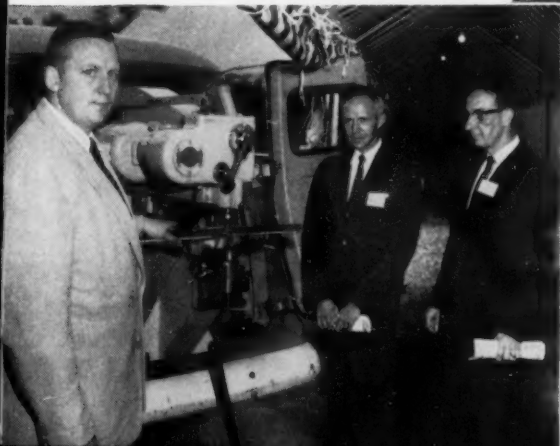
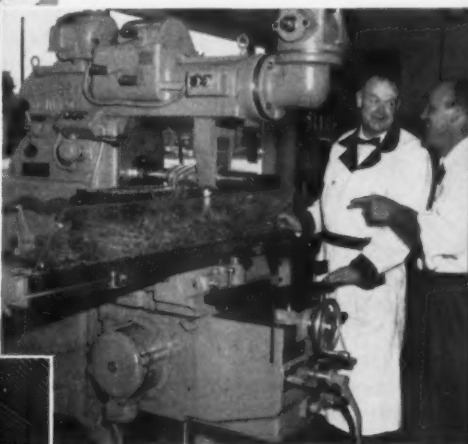


Right: Amos Riggs (right) explains the method of operation of a Cincinnati Lathe and Tool Co. "Spiral Point" Grinder to E. M. Taylor (left) and R. H. Vonderheide of Parks Woodworking Machine Company. This special grinder is particularly designed to sharpen the newly developed "spiral point" drills.



Left: The Suburban Machine Company Model V.A.H.-25 "Angle Master" milling, drilling and boring machine is being explained by Leo Hengehold (right) to L. F. Benson of the Wall Street Journal. The fully universal positioning of the head is the outstanding feature of this particular machine.

Right: During one of their few free moments during the exhibit, Bill Lindsley, (right) Lodge and Shipley Co. jokes with Pat Foozer of the Greaves Machine Tool Division. Meanwhile, the Model 2 XH Milling Machine continues to slab mill a 1/16 inch cut at 4 1/4 i.p.m. out of a steel workblank. Cutter is six inches wide.



Left: John Thomas (left) standing by an American Pullmax Co. Model 1100 Universal Shear and Forming Machine explains to Paul Caldwell and James Anderson (right) of Plastic Research Products that the show spilled over into the yard and he had to demonstrate his machine from the rear of his station wagon parked by the tent.



New Tool Provides Faster, Better Cutting

**Newly developed manufacturing process used in
producing "Hob Ground" milling cutter.**

The toolmaker's answer to the problem of cutting the tougher materials coming into increasing use have received another dimension recently. W. C. Chapman and Sons, Inc., Baltimore, Md., has recently developed a method whereby the company is able to "hob grind" an end milling cutter. Each "hob ground" end mill has a helix ground into the diameter of the mill. The width, depth and pitch of the helix can be varied so as to obtain the best tool configuration for any given material and use. The recommended general purpose cutter has an eight pitch. Although applied only to end mills so far, the manufacturer anticipates application of the same principle to other types of milling cutters.

The new design offers many advantages. The interrupted cutting edge serves to reduce the side thrust load on the cutter and permit use of a greater unsupported length of the cutter than normally, and, regardless of flute length, deflection is for all practical purposes eliminated. As a result the depth of cut which can be effectively achieved is greatly increased. Heavier feeds are also possible, in some tests running as much as twice the previous rate. Further,

generally speaking the horsepower drive requirement is approximately halved.

Due to the fact that a relatively large number of comparatively small chips are formed, the heat produced is reduced to a minimum and the ever present chip problem attendant on roughing operations is practically eliminated. High tensile steels particularly are rough milled more efficiently especially in the extrusion die field.

With all these advantages there are no particular regrounding prob-

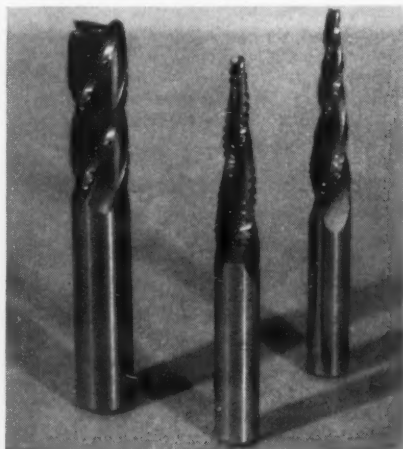


Illustration showing three different available types of "Hob Ground" end mills.

lems, as tool regrinding is achieved by conventional methods on conventional equipment. New tool design has again provided an answer to the new questions raised by the tougher materials that are being increasingly specified.

★ modern machine shop ★

N. M. T. B. A. Films. Of 147 motion picture films on machine tools and machining operations listed in a 26-page booklet published by the National Machine Tool Builders' Association, 84 are in color. Ranging in showing time from 5 to 70 minutes (average time about 30 minutes) all films are available without charge upon request to the member companies producing them.

Many of the films have been prepared for sales or training purposes and are consequently concerned with specific machining operations. Others are institutional types devoted to telling the story of the part played by machine tools in satisfying man's never-ending search for a higher standard of living.

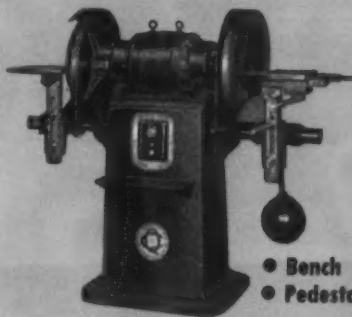
With few exceptions, all films are 16mm., with sound. Many are in such demand that it is suggested requests for their use be made three to four weeks in advance of an intended showing—and a choice offered of two or three dates.

Copies of the new booklet listing the films are available from the National Machine Tool Builders' Association, 2071 East 102nd St., Cleveland 6, Ohio. Requests for showing of an individual film, however, should in all cases be directed to the member company concerned.

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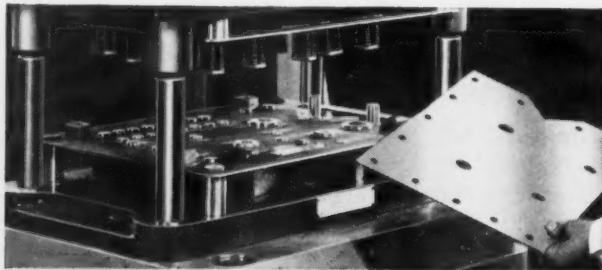
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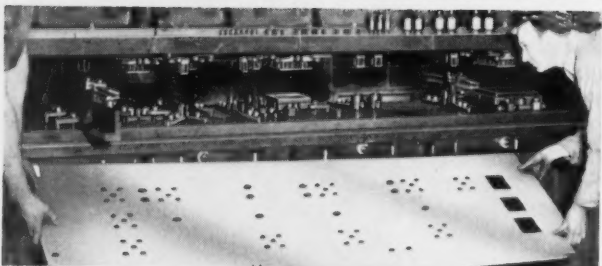
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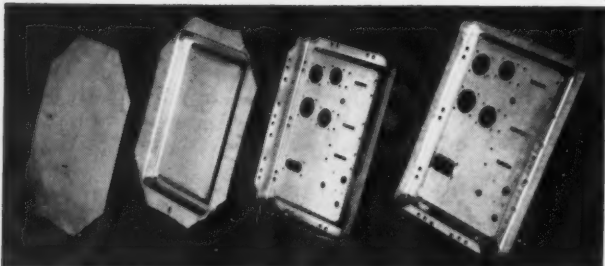
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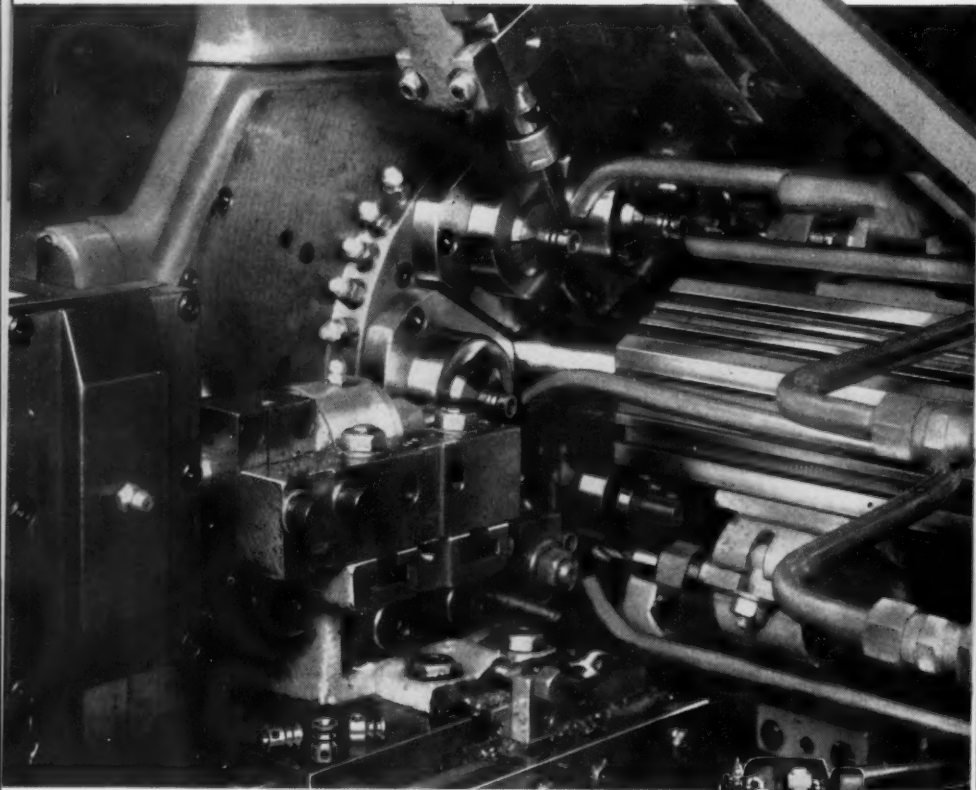
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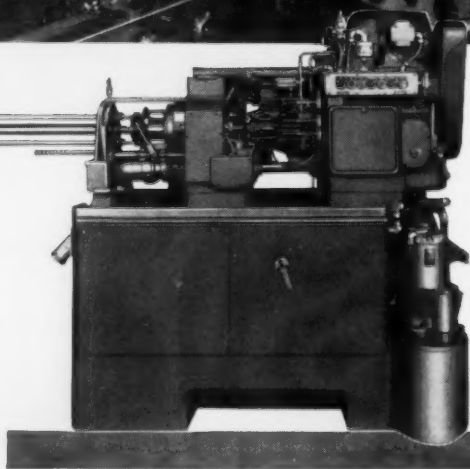
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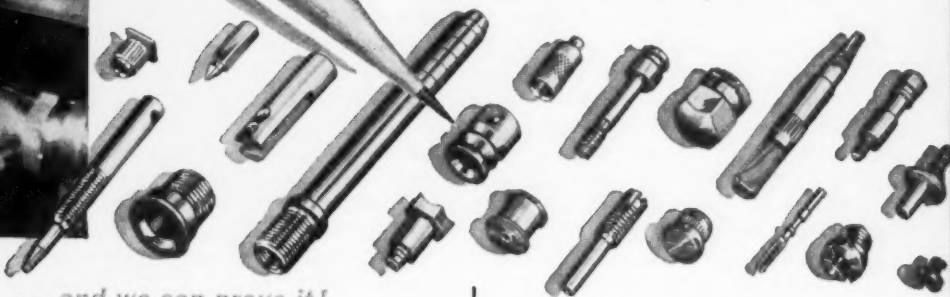
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HOW TO DETERMINE

Which Type of Numerical

Qualified man should be selected to study all phases of numerical control so that he can become expert in making recommendations to management.

By GILBERT C. CLOSE

Field Editor, Modern Machine Shop

With nearly 20 major companies now operating successful numerical control systems on a maintained production basis, those who have been engaged in the development of numerical control since it was conceived as a possible new production system can now stop theorizing and convert opinions to established facts. However, there is no need to make any excuses for those early theories. Most of them have been infused with vitality by the currently successful operations, and are now a part of the factual data on these new systems of production.

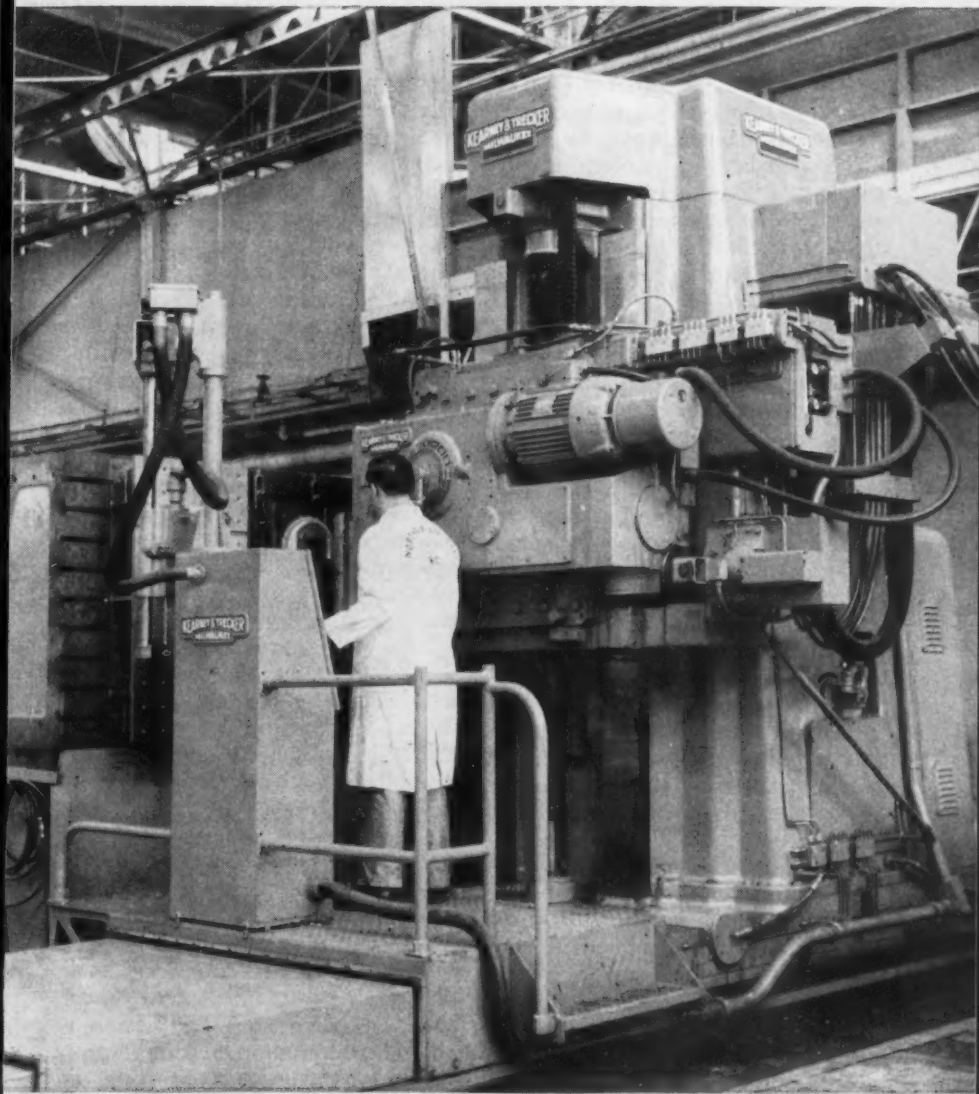
The systems now in operation vary widely in detail. Different methods of data processing and storage are employed, including punched cards, perforated tape, and magnetic tape. Applications vary from high-speed roughing work to slow, very precise three-dimensional machining operations (some of which use five controlled machine axis motions), with all the variations in between. Some numerical-

ly controlled machines are used for long-run, repetitive production work; others for short-run prototype or production tooling work.

Despite these variances in detail, all successful systems to date have certain characteristics in common. Chief among these characteristics is the "once upon a time theory" and now established fact that management must regard numerical control as a totally new manufacturing and production technique and *not* as just another group of new machines added to the production line. It has been proved conclusively that taking the lesser view of the new systems leads only to minimum results. And minimum results from a numerical control system are a far cry from maximum results.

Stating that management concepts of numerical control must encompass the larger view — that numerical control must be regarded as an entirely new and efficient production system, not as a glamorous setup of a few new machines — does not imply that management

Control Is Best for You



Illustrated in the above view is a huge Kearney & Trecker tape-controlled profile mill which is now in operation in Northrup Aircraft's new numerical control production system.

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"... comprehensive knowledge of the end product required will aid in determining which type of numerical control system is best."

itself must become expert in the heterogeneous ramifications of numerical control. Comprehensive knowledge of all system components from computer electronics on through design for numerical control production, metallurgy, and onward to basic machine problems which are more common on the shop floor than in the conference room, belongs to the expert or specialist. It would be a superfluous commitment of management time and effort to secure this comprehensive knowledge as many of the problems are either too specialized or too detailed for management consideration.

As pointed out by top management in several large plants where numerical control is now being successfully employed, the best plan is to select a qualified man (or men), give him a status in the organization so that he can work progressively and override minor objections and difficulties and is answerable only to high-level management, then give him the time and opportunity to become an expert in all phases of numerical control. Once this man has acquired the necessary knowledge and background, let him become the center and the "guiding light" for the new numerical control system.

The man appointed to assume this responsibility, according to numerical control experts who have been appointed to such a position, should follow a definite course of action to secure the best possible

results from the contemplated numerical control installation. After acquiring a comprehensive knowledge concerning the various types of numerical control equipment available, and how it operates, he should then ascertain exactly how the new system will be applied in his own company with regard to part shapes and sizes, metals to be machined, tolerances to be held, qualities expected, and so on. This study should extend to possible future production also. This comprehensive knowledge of the end product required will be a distinct aid in determining which type of numerical control system is best qualified to produce it. It will provide a basis for comparison when a field study of other successfully operating numerical control systems is made. And unless this field study is made, the most potent source of practical information available to date will be ignored.

These same experts point out, however, that a field study of successfully operating control systems made by someone lacking a thorough knowledge of numerical control may lead to some costly misconceptions. Surface appearances are often misleading. Apparent ease of data processing for a specific application of numerical control in one plant doesn't necessarily mean that the same ease and economy will accrue if the same data processing system is used for other numerical control applications. The system may be too limited, or too

abundant—it may provide information that is not needed for the alternate application and omit information that is absolutely necessary. The same applies to machine setups. While a machine in one plant may be controlled by multi-channel magnetic tape while it performs close tolerance, three-dimensional machining operations, this does not mean that the same setup can be employed economically in less critical operations.

An incident which occurred recently at the Northrop Division of Northrop Aircraft, Inc., illustrates how easily a misconception of numerical control operations may be obtained by anyone not thoroughly grounded in the science. An executive from another company which

was contemplating installation of numerical control equipment was inspecting a numerical control installation at Northrop. The visitor admittedly knew very little about numerical control. During the tour, it was brought out that the typist using the electric typewriter in data processing work was making the computer input tape and had been with the company only two weeks and had had no specialized training whatsoever.

The sad part of this story is that the above bit of almost abstract information impressed the visitor more than any other facet of the huge numerical control installation. Anyone intimately acquainted with numerical control would have known immediately that the ease of this transcribing job was merely incidental to operation of the system as a whole, and should not in any way influence the type of numerical control and data processing equipment ultimately selected.

Experts point out that to carry out the concept that numerical control is a total system within itself, and to obtain maximum results from that system, it should be planned so that production starts with a normal drawing (or better, a numerical control format drawing) and ends with a completely machined and inspected part. Data processing and the resultant numerical control program should cover every aspect of production, leaving nothing to individual judgment, and not permitting deviations of any sort. This includes such detailed information as cutter speeds, how cutter teeth should be sharpened,



An operator places a role of inch wide perforated tape on the machine interpolator which will transform perforations on the tape into machine control intelligence.

"... data processing should produce a program which will obtain top speed and top quality from the hardware involved . . ."

number of cutter teeth, spindle r.p.m., machine feeds, and so on. To put it bluntly, data processing should produce a program which will obtain top speed and top quality from the hardware involved, and the operators of the hardware should be literally "stuck" with the program which allows for no deviation or infringement by individual judgment. If a program has been planned for maximum results, it is quite obvious that any deviations from the program could result only in a lowering of total efficiency.

Northrop Aircraft, Inc., is now

operating over \$1 million worth of numerical control equipment. This includes data processing equipment for programming for maximum results. A simple illustration will do a great deal more to show how effectively such equipment can be utilized than ten thousand words of generalized commentary.

Northrop had produced a left-hand die by conventional methods and for conventional application which required 10,000 lb. of templates, plaster molds and backup material, and 400 work hours to produce. Nine separate manual operations were required. It was then decided to produce the right-hand die by numerical control. This meant that a control tape would have to be produced. Only 12 work hours were required to produce the tape and 24 hours to machine the die blank. A single manual operation was involved. The finished tape weighed 4 oz. as against 10,000 lb. of material used to produce the conventional die. Accuracy was increased approximately seven times. It was decided by the author to use actual figures rather than percentage figures to illustrate this particular application as the savings, if expressed in percentages, would be almost unbelievable.

Men now in charge of large numerical control departments point out that selection of the system itself must be predicated on the type of numerical control work that will be accomplished if overall



These buttons control machining operations on a K & T profile mill. Movement of vertical and horizontal ways is recorded in thousandths of an inch on control panel.

maximum results are to be obtained. In this particular instance "maximum results" implies the most and best work obtainable for the least outlay of money. Some plants may have available equipment which can be worked into the new system, and thus the expenditure of money for duplicate equipment can be avoided.

If, for example, a company is already equipped with facilities for punched card control of other organizational functions, these same facilities might be used for developing punched card data processing for numerical control. If no such facilities exist, an electric typewriter producing perforated tape could conceivably be a more economical method of entering the field. In other cases, a system employing magnetic tape, which can be produced by computers or commercially from perforated tape, might be the logical choice. The ultimate choice will depend upon the specific numerical control applications planned, and how other successfully operating companies have met similar problems. It would be both foolish and a tremendous gamble, according to the experts, to install numerical control without first drawing upon the experience of others who have successfully entered the field.

A brief summary of how one major company entered the numerical control field and solved the various problems that accrued may aid others in planning a definite program of action. Like all other major companies who have adopted numerical control, Northrop Aircraft, Inc., first appointed a quali-



A part of the electronically controlled interpolator installed on each tape controlled machine is shown here. Sections of the interpolator are easily available for inspection, maintenance and repair.

fied expert, answerable only to top management, to head the program.

Northrop equipment is now operating 24 hours a day, and turning out numerous high precision parts and tools for aircraft and missile programs. Yet anyone visiting the company would be unaware that a numerical control program exists unless he actually saw the machines in operation. A main goal during inauguration of the program was to keep it unobtrusive and avoid the all too prevalent impression that "here was something new, different, and glamorous" which could only inspire awe and a degree of timidity in tackling the work to be done.

Northrop has several large numerically controlled profile mills

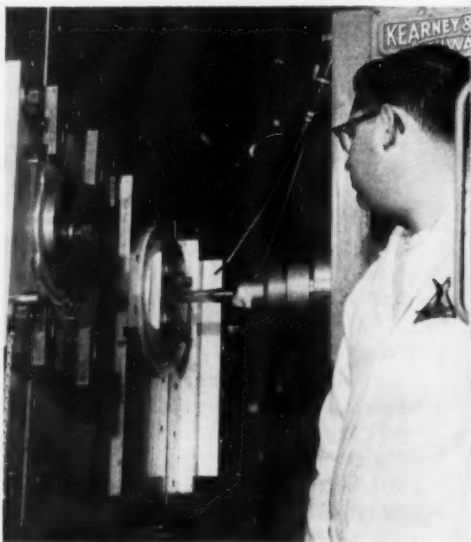
"... efficiency derives largely from the nature of the numerical control organizational setup . . ."

in operation at this time. Data processing is accomplished on either a small Bendix G-15, or a 797 IBM, or a 704 IBM computer. Magnetic control tapes are not used. Instead, punched paper tape is used as the machine control medium, and an interpolator on each machine tool takes the information from the perforated tape and transforms it into the necessary machine control intelligence. With this data processing equipment, the perforated tapes, and the interpolators, it has been found that a part so small that it utilizes only 1 percent of machine capacity can be produced more cheaply than by any other known production method.

Officials at Northrop are certain that this degree of efficiency derives largely from the nature of the numerical control organizational setup, and the unobtrusive manner in which the new system was introduced. Initial plans, prior to installation of the equipment, were to set up a separate numerical control department, staffed with experts, and practically autonomous in operation. But after a series of conferences, these plans were changed. As already pointed out, company officials wanted to avoid the impression that "something new, different, and glamorous" was entering the organization. The idea then evolved to "plant" numerical control work into existing departments in a manner so that no sharp distinctions would exist. Under this plan, no

special budget is required. The numerical control work flows parallel with non-numerical work, with each department absorbing its little portion of the new work in stride.

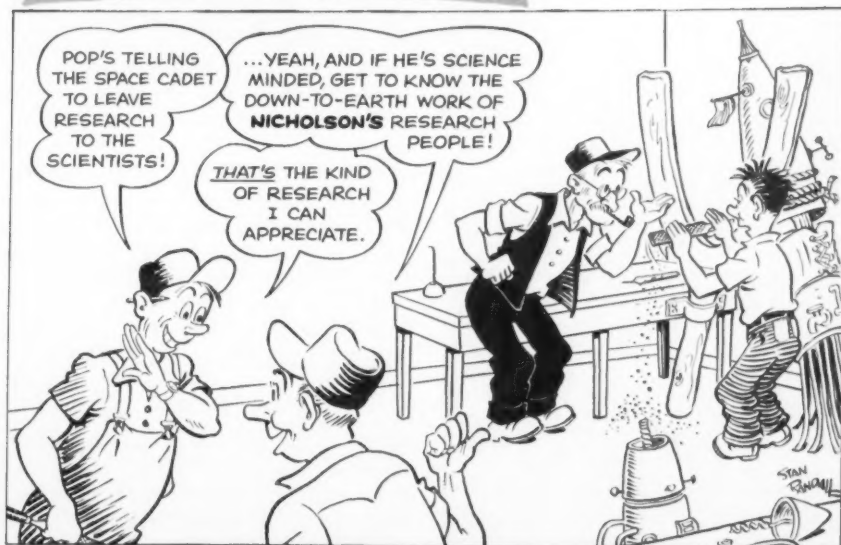
The above does not imply that Northrop did not employ experts in numerical control, but these "experts" were selected from the existing organization, then properly trained. In this training, a point was made to make certain that the employees in the various departments who would handle the numerical control work were thoroughly trained in all phases of numerical control. Here again a departure was made from the idea



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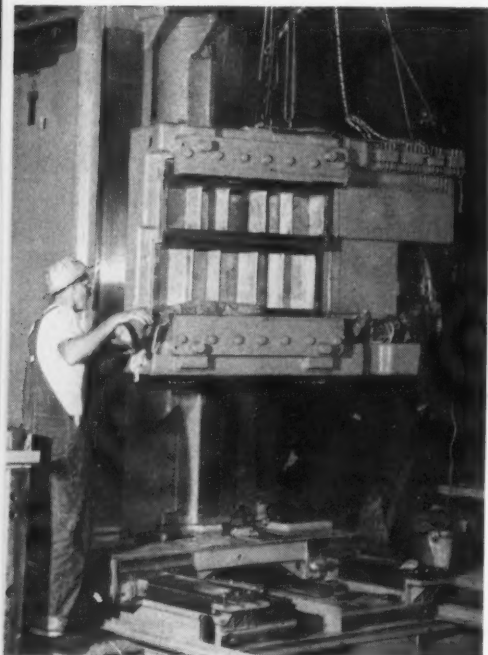


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"... it was decided to make everyone engaged in numerical control work a part of the new system."



The tape controlled profile mills have replaceable 24-foot horizontal ways made from precision ground spring steel. Vertical ways are hardened and ground, not scraped in the conventional manner.

that a numerical control department should consist of a group of co-operating specialists. From the beginning, it was decided to train each man engaged in numerical control work in all phases of numerical control science so that cooperation between the various segments of the new system could be accomplished constructively.

More specifically, each person

was made thoroughly cognizant of the problems faced by his associates. To accomplish this, machine operators were sent to school along with program planners, then in turn the program planners went to school with the maintenance men, and so on. This plan eventually terminated in a group of people engaged in numerical control work who each have a healthy respect for the problems and difficulties of the others and, even more important, have the "total system concept" so necessary to successful numerical control operations. According to Northrop officials, the results of this comprehensive training program for each key employee engaged in numerical control work have been entirely constructive.

Northrop officials realized at the beginning of their numerical control program that a certain degree of resistance to similar programs had developed in some shops — that same type of resistance which always accompanies any progressive industrial development. Such an attitude could not be other than detrimental. To avoid it, it was decided to make everyone engaged in numerical control work, from maintenance men to the program planners, a part of, not supplementary to the new system. All channels of information would be kept open to everyone involved so that at all times each would know what the other was doing and why he was doing it. This system has

"Here is a production system which fulfills the requirements of the new weapons systems."

also proved, not only constructive from the organizational standpoint, but vastly helpful from a technical angle. Workmen far down the line in the numerical control department are constantly channeling back information on this new science which is very helpful to the people responsible for the operation of the department.

To avoid misinterpretation of numerical control as a form of so-called Detroit-type "automation" that would cost some people their jobs, company officials decided to "throw the light," so to speak, on the true status of numerical control and its applications in the aircraft and missile industry. It was made known to everyone involved in the program, and to the rest of the shop force as well, that . . .

"Here is a production system which fulfills the requirements of the new weapons systems. These new weapons systems require parts which are machined faster, from harder materials, and to greater accuracies than hitherto thought possible. It would be almost impossible for men to accomplish the high accuracy of this work using conventional equipment. Therefore, numerically controlled machines, with their associated data processing equipment, are performing a job which cannot be accomplished in any other way."

The company made it known also that involvement in the program, and a willingness to acquire the

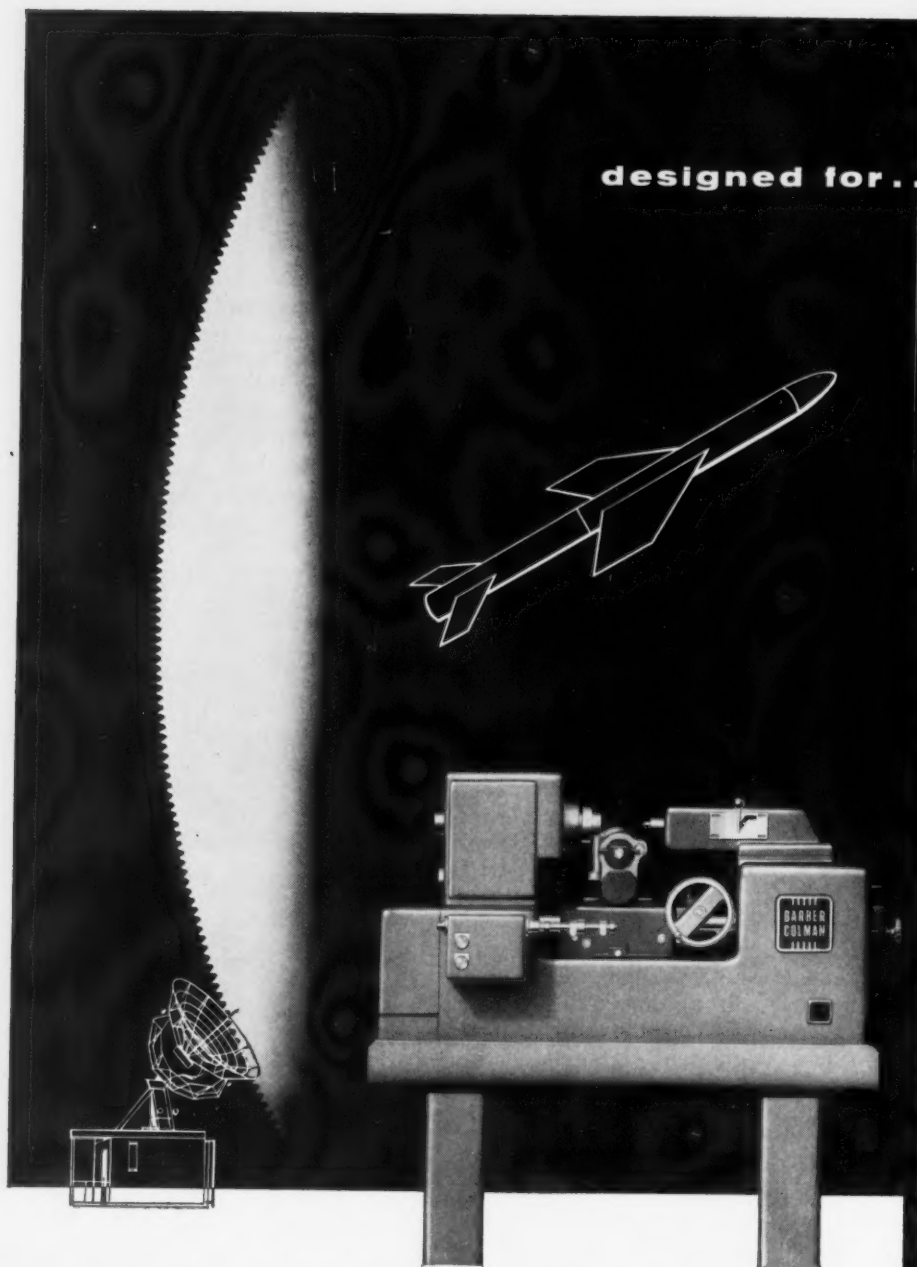
knowledge required, would result only in up-grading, not the loss of a job.

While the detailed technical aspects of the new Northrop numerical control system might not be applicable in other plants, company officials are firmly convinced that the concepts employed in developing the system, training the personnel, and obtaining organizational acceptance could be used constructively in many plants now planning installation of a numerical control system. As one official pointed out—"It is these intangibles, as well as the hardware itself, which may well determine whether a new system will operate at maximum efficiency, or become a borderline operation."

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The machine has a capacity for using 3" diameter hobs providing for a greater number of flutes to produce smooth gear tooth profiles. Using proper care in rigid tooling, accurate blanks, mounting of hob and work, and Class AA hobs with accurate sharpening, precision gears to Class 3 tolerances are hobbled with this machine.

Several design features are a departure from standard hobbing machine construction. There is no hob slide

— only a hob carriage for conventional feed. In place of a hob slide, the hob arbor is mounted on a swivel which adjusts to compensate for hob thread angle. The work slide is stationary, and the hob swivel raises and lowers to meet diameter requirements. The machine has no overarm support, permitting greater work visibility and operator access. Both work and hob spindles are mounted in precision anti-friction bearings to provide accurate rotation at high speeds. The hob carriage also has anti-friction way supports, and the metal-to-metal contact afforded provides more rigidity than obtained with gib-type mounting. An infinite number of hob speeds are provided without change gears in the range of 200 to 1200 r.p.m.

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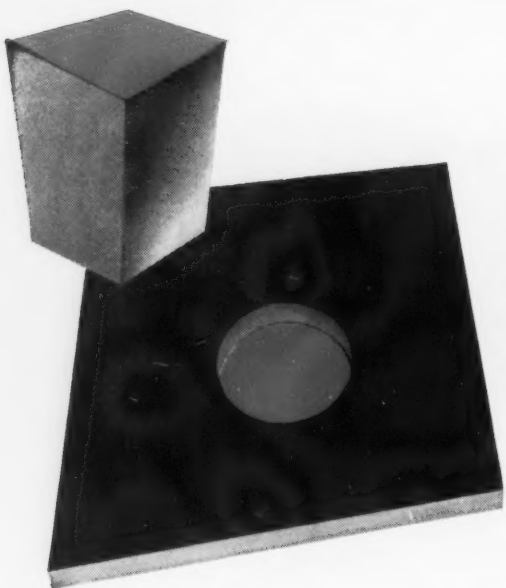
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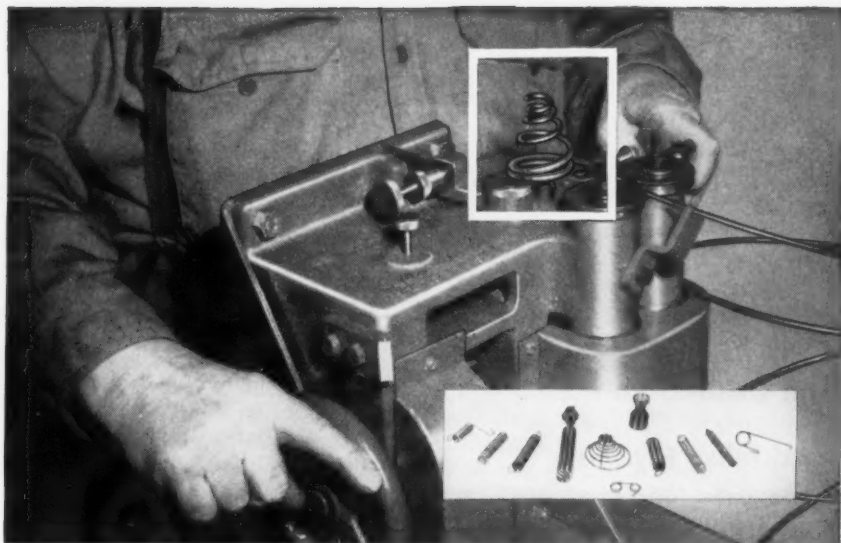


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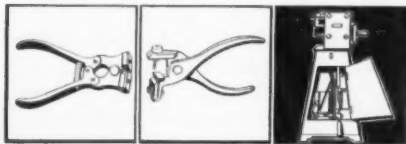
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Starret adjustable jaw cut nippers (left) and Gardener Hook-Kon spring looping tool (center) — handy, precision, time-saving accessories for spring coiling. Perkins Spring Coiler available as bench model or power model shown here, (right) for tool shop or continuous runs.

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November, 1958

modern machine shop 149

more production through modernization

*Techniques for increasing output with
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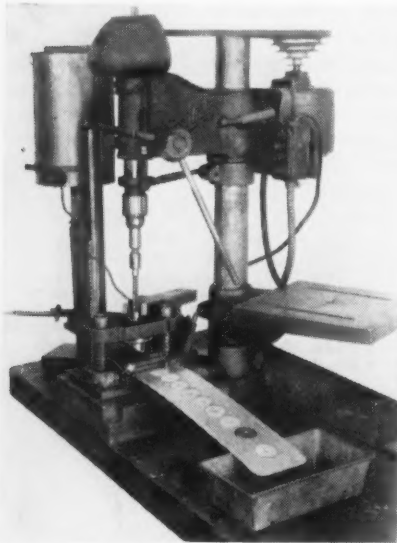
Gun Drilling Solves Concentric Cavity Machining Problem

Successful use of gun drilling in regular production does not necessarily mean the use of large and complex setups. While there are certain requirements regarding the basic fixture, workpiece and drill

operation which must be followed, these can often be attended to with simple installations. The end result is the same close adherence to dimensional tolerances and the same high finish as characterize gun drilling setups of greater complexity.

An example of a simple but quite unusual gun drill operation is the one being used successfully by the Bridgeport Special Tool Company. The company had what it estimated to be an elementary operation when it contracted to make a small precision part. The part was a small disc of cold rolled steel with zinc plating, 1.148 inches in diameter and flat on both sides. It required a concentric cavity with 45 degree sides, 0.187 of an inch at the bottom, plus or minus 0.005 of an inch to be drilled in the center of the piece. Tolerances had to be within 0.007 inch t.i.r. The bottom of the cavity was only 0.013 (plus 0.007 inch, minus 0.005 inch) inch thick, that is a minimum of 0.008 of an inch, with a maximum bulge of 0.0005 of an inch.

Several conventional methods for producing the cavity were tried. Swaging left a belly on the underside of the piece. Drilling, rough



Drill press is shown set up with 0.3750 inch carbide tipped gun drill 7 inches long.

milling and then a finished milling proved unsuccessful and costly.

Acquainted with the success of gun drilling on larger jobs, he took his problem to engineers at Eldorado Tool and Manufacturing Corp. After examination of the factors involved, it became evident that the job could be done with a deep hole drill setup arranged on a drill press. A solid carbide tipped gun drill, 7 inches long and 0.3750 inch in diameter was made with the carbide point sharpened to fit the contours of the depression in the discs. This took advantage of the characteristics of all gun-type tools: free cutting at minimum end pressure, designed to cut to center and use of hard grade of carbide.

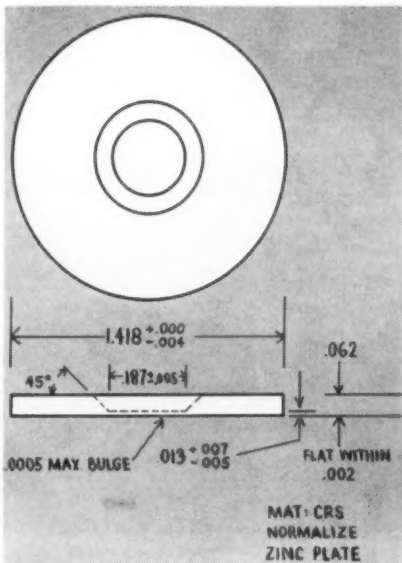
The setup was a simple one, involving an air-operated fixture to control the drilling mechanism, a bushing to guide the drill, a hopper made of tubing to hold the discs, and a disc guide or chute to control the movement of the discs, carrying them under the bushing to receive the drill, then out when the operation was finished. A hand feed was later substituted for the latter step with no loss of production speed or quality of product.

The same basic setup that completed the first successful test run is still in use. It has produced millions of parts without a breakdown. The lone expense incurred since installation has been the sharpening of the drill, an action which was undertaken only after the production of some 25,000 pieces. Tolerance was held within 0.003 inch t.i.r. and inspection was held only after several hundred of the discs had been drilled. The

press was run at about 2,200 r.p.m. with a resultant high rate of production. Surface finish was very good and the piece was well within the diameter bulge allowance of 0.0005 inch. As with most drilling operations, use of a lubricant was required. In this case, because the problem of chips was not serious, it was not necessary to supply the lubricant under high pressure. Consequently, White and Bagley No. 2190 oil was simply run onto the piece through the bushing. This operation proved highly successful.

Although the entire operation was one of the utmost simplicity, the discs were turned out with a cavity which adhered to required tolerance and which had a mirror-like finish. Scrap loss was negligible.

The press was operated by an air



This drawing shows the small precision part being made and the tolerance limits.

More Production . . .

valve at 125 lbs. pressure. Each piece was automatically discharged after drilling, moving out from under the drill as the next piece was hand fed under the drill. A stop bar assured perfect aligning of each piece to be drilled. A brass screw and nut was set in to regulate the depth of the drill into the work-piece. In this way, uniform depth was maintained. The fixture was firmly mounted to the drill table. For more data circle 66 on Postpaid Card

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Stainless Steel Screw Conveyors Solve Corrosion Problem

To solve a serious corrosion problem on screw type conveyors in wood pulp mills, stainless steel is being used instead of the carbon steel of which the conveyor was formerly made. Armco Type 316

Stainless Steel has been specified because of its superior resistance to this type of corrosion.

The flights of the screw conveyor are 18 $\frac{3}{4}$ inches outside diameter, and are welded to a 6 inch Schedule 40 Type 316 stainless steel pipe. They are of the interrupted flight design and formed in specially made dies on a hydraulic press brake and are then continuously welded, on both sides, to the central shaft by the metallic arc process. Overall length of the screw is 21 feet 9 $\frac{3}{4}$ inches long. The distance of the flight on the shaft or pipe is 17 feet 11 inches.

After fabrication, stubs and stub shafts are attached. In operation the stub shafts rest in self-aligning bearings. The stubs and stub shafts are also made of 316 stainless.

The complex fabrication is done by Felker Brothers Manufacturing Co., Marshfield, Wisconsin.

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Surface Grinding Safety Deposit Box Doors

Remarkable surface-grinding capacity on small parts is being obtained in a large number of plants through use of large horizontal-spindle, reciprocating-table surface grinders, equipped with large-area magnetic chucks. Considering that machines of this type are found in operation in table-width capacities all the way from 12 to 36 inches, and with table lengths varying all the way from 36 to 192 inches, it is obvious that some of the larger units provide tremendous horizon-



Machining operations include trimming the flight to the proper O.D. and machining the stub shaft to take the bearing sleeve.

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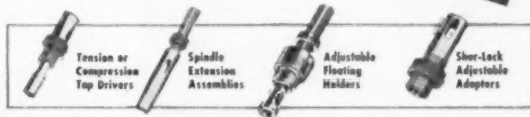
Tool Control Boards are a tested and proven method of increasing the efficiency of production machine tools. They provide a system of scheduling tool changes according to pre-determined efficiency standards. You cut down-time, insure longer tool life, reduce tool breakage, and lower scrap losses.

SUMMARY OF ADVANTAGES

- ① Reduces down-time, provides an efficient system of programming tool changes.
- ② Automatically controls machining operations; provides visual record of used life of each tool.
- ③ Assures more efficient use of tools, reduces breakage and scrap losses.
- ④ Provides storage and complete facilities for presetting tools at the machine.

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tal capacity. This is not to mention, of course, that they also have great vertical capacity; some of them are readily adaptable for grinding V-ways in machine bases, and handling other castings of comparable height.

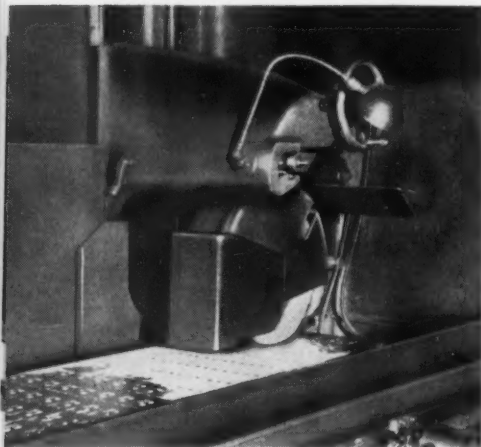
This type of machine is particularly suitable for surface-grinding work where a straight scratch pattern is desirable. It is well to remember that the rate of production (therefore grinding cost on any type of small pieces) is directly affected by the amount of stock removed. Presence of scale, however, means nothing to a grinding wheel. Consequently it is a point in production strategy to provide only a minimum amount of material for removal by the surface grinder. Moreover, just as the grinder operates without trouble in cutting

scale or hard spots, it is used to advantage for surfacing particularly hard material, including parts which may have been preliminarily flame hardened.

An interesting instance of high production grinding on small flat pieces is the processing of safety deposit box doors by the Herring-Hall-Marvin Safe Company. Here, a Mattison horizontal-spindle grinder is surfacing these small doors in 50 percent less production time than was required by a previous method. These doors are approximately 1/2-inch thick, and are made by combining steel and stainless steel.

One interesting aspect of surface grinding large quantities of small flat pieces on a magnetic chuck, where the tolerance allowed is plus or minus 0.001 inch, or more, is that one can eliminate necessity for using a micrometer on each individual chuck load. This is done by grinding the first chuck load to the high allowable limit, then coating one of these pieces with copper sulphate. On following chuck loads, the workpiece coated with copper sulphate is placed near the center of the load. Grinding then proceeds until the abrasive wheel begins to grind the coated piece. At this time it is perfectly safe to assume that all other pieces have been brought to required thickness tolerance.

After a sufficient number of pieces have been placed on the chuck to make a suitable chuck load, and the chuck has been energized, it is in order to try to move one of the pieces, to find out whether the parts are securely held. This will protect both operator and



Blanks for safe deposit box doors are shown being finish ground on surface grinder.

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work against any faulty chuck action which may develop. On most of the larger traveling-table, horizontal-spindle surface grinders, two or more chuck sections are employed. Such sections are more easily handled than a single chuck and are less likely to show any distortion in service.

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Carbide Insert Tooling Licks Scarfing Problem

A problem in scarfing the external and internal weld bead on continuously welded pipe had arisen at the Beall Pipe & Tank Corporation. Production on the pipe was about 6000-feet per shift in 40-to-50 foot lengths on 4-inch to 16-inch o.d. pipe. A weld bead of about $\frac{5}{8}$ -inch wide and $\frac{1}{4}$ -inch thick was being

laid down at 1500 to 1800 degrees F. at the point where it was to be scarfed. The feed was about 35 feet per minute. Trouble came at the cutting edge with the metal bead sticking to the cutting tool. The machine had to be shut down about every 6000-feet due to tool breakage and wear.

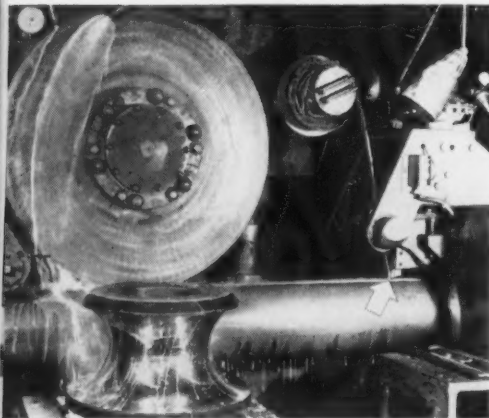
Recently they switched to grade CA-610 carbide indexable insert, and have been getting 10,000-feet of pipe per single indexable insert. Also, the feed is almost doubled to 50-to-60 feet per minute. In addition, the weld bead is now cut in a continuous stream, and the scrap ribbon is automatically wound on a scrap spool simulating ribbon stock when finished. The CA-610 carbide, made by Carmet, the carbide producing facility of Allegheny Ludlum Steel Corporation, is particularly noted for its use in heavy roughing cuts and in the general machining of steel.

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Friction Power Losses Cut by High-Pressure Lubrication System

Frictional losses are probably greater in a sizing machine than in any other type of machine tool. There are two-major friction points: between the cone and the work jaws and between the work jaws and the support table. All the drawbar force—from 25 to more than 1600 tons—is exerted through the inclined contact surfaces of the cone and the work jaws. Force on the work jaws is applied downward



Changing to carbide indexable insert tooling on machine solved a scarfing problem.

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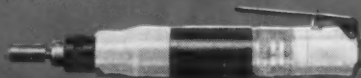
for drilling

**BUCKEYE-QUIETOOL
DRILLS**



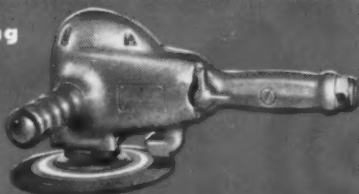
for fastening

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and outward. The outward force component forms the work piece while the downward component contributes to the friction load between the jaws and the support table.

The combination of high bearing loads, large contact areas and relatively low sliding velocities presents a difficult lubrication problem. An obvious solution is a high-pressure, automatic lubrication system. But, tubing requirements made it almost impossible to design a compact, rugged lubricating system that would be suitable for application to all machines.

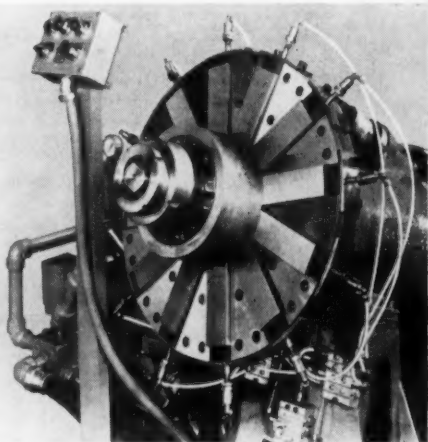
Tubing must withstand 400 to 600 p.s.i. internal pressure to supply a metallic-based grease to the sliding surfaces on Grotnes sizing machines, both expanders and shrinkers. Tubing must also be flexible as jaws move several inches at 3 to 10 cycles per minute. Inclined-table expanders have a requirement all their own: flexible tubing must "stand firm" between fittings, both pressurized and unpressurized. Each machine uses 14 to 30 pieces of unsupported tubing from two to four feet long.

Shrinking machines present more of a lubrication problem than do expanders for two reasons: (1) shrinkers use considerably more tubing, and, (2) tubing is underneath the table and inside the outer supporting cone. Since there is less space in which to put the extra tubing, the tubing which is employed in shrinking machines must, of nec-

essity, be of an especially flexible, compact and reliable nature.

These requirements narrowed the tubing selection problem to braided rubber hose and a relatively new polyamide tubing called NYLA-FLOW pressure tubing. This tubing, manufactured by the Polymer Corp., had been used in centralized lubrication systems but not in the heavy machine tool field. To prove it would work on the sizing machines, engineers of the Grotnes Machine Works, Inc. installed Type-H, Nylaflo pressure tubing on several expanders and shrinkers that would give a good cross section of normal operating conditions. Although it is practically impossible to determine the exact friction losses, engineers feel they have reduced these losses from 50 to 75 percent by using the new tube and high pressure lubrication.

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This specially designed expander to size small diameter heavy cross section alloy jet engine rings was used to test tubing.



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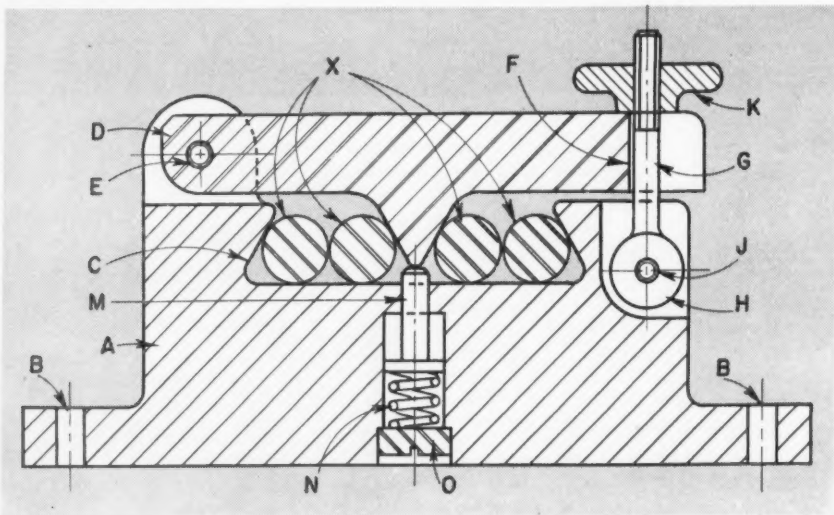
Several times-saving ideas and suggestions for the man in the machine shop.

Fixture Clamps Four Rods for Simultaneous Milling

By W. M. HALLIDAY

The fixture shown herewith is designed to hold and automatically position correctly four round workpieces for milling shallow flats on their sides. Hold-down bolts inserted through holes, B, fasten the

main body of the fixture, A, to the machine table. A wide V-slot, C, is machined along the top of the fixture with its bottom parallel to the base of the fixture. The side walls are machined to a 60-degree angle as shown. The slot is made slightly greater in depth than the diameter of the rod stock, X, which is to be milled and about four and one-half times the diameter in width.



This cross-sectional sketch shows a fixture specially designed to grip and position four bars of round stock for simultaneous milling of shallow flats on their sides.

The clamping arm, *D*, is made so that it swivels easily about a fulcrum pin, *E*, which secures it in the slotted extension of the fixture body. The hole in the arm through which the pin is inserted is very slightly elongated so that the arm can float about 0.30 inch. The other end of the arm is slotted, as shown at *F*, to receive the shank of a ring-bolt, *G*, which is anchored in the slot, *H*, in the base of the fixture by the pin, *J*. A locking nut, *K*, is fitted to the free end of the ring-bolt to apply downward pressure to the arm when the fixture is in use.

On the underside of the arm, in the middle of the V-slot, is located a V-shaped projection, *L*, with polished 60-degree sides and a rounded nose. A headed plunger, *M*, is located in the center of the V-slot in a hole counterbored through the bottom of the fixture, so that it is in alignment with the V-shaped projec-

tion of the clamping arm. The plunger rests on a light coil spring, *N*, which in turn rests on a plug, *O*, threaded into the bottom of the fixture.

In operation, four rods are placed in the V-slot and automatically approximately positioned by the extended plunger. When the arm is placed in the locking position and

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downward pressure applied by means of the lock nut, the rods are forced downward and outward by the V-shaped projection, *L*, until they are gripped in position against the walls of the V-slot.

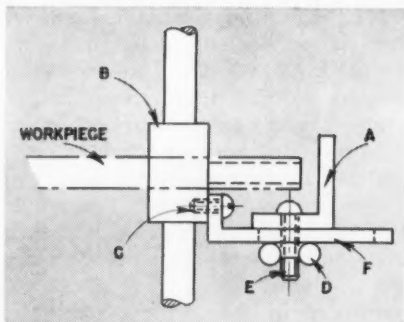
Endwise setting of the rods in the fixture may be achieved by the addition of a fixed stop plate attached to one endface of the fixture body.

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Die Stop for Determining Thread Length

By ROBERT HILL

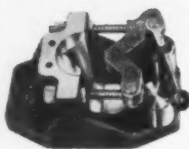
To save time and increase accuracy when threading a large quantity of rods, screws and bolts,



Sketch of handy die stop designed for use in quantity threading of rods, screws and bolts.

our screw machine operator made up a small die stop of the type indicated at *A* in the accompanying sketch, which eliminates the necessity of measuring each piece separately to obtain the exact thread length desired. The stop, *A*, is fastened to the die, *B*, with a 3/16-inch round head screw, *C*. The wing nut, *D*, on the 1/4-inch round head screw, *E*, and the slot, *F*, in the die stop allow for adjustment of same. The stop, which is made from approximately 3/16-inch thick stock, can also be applied to other types of equipment used in cutting threads.

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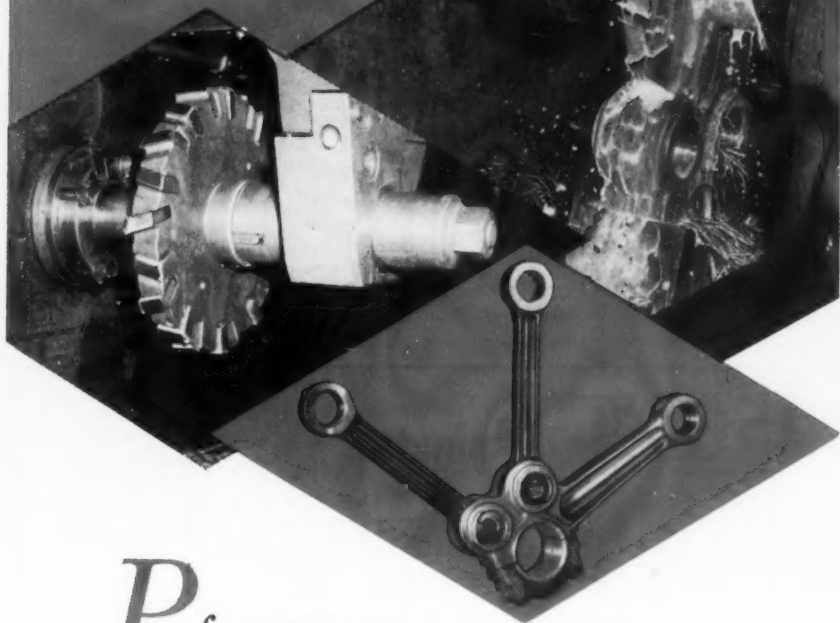
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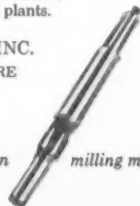
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milling machines

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Simple Idea for Viewing Hidden Work

By H. J. GERBER

We often use a small dental mirror, supported by a magnetic base indicator holder, for applications similar to the one illustrated. In this particular case the mirror is being used on a small die filing machine to observe the progress of a filing operation on a die insert.

In a setup of this type the operator can, with little effort, observe the progress of a cutting tool which is hidden from view in normal working position. The standard universal attachment provided on the indicator base permits the posi-



Small dental mirror, supported by a magnetic base indicator, permits observation of progress of cutting tool which is hidden from normal operator working position.

tioning of the small mirror into even rather restricted spaces.

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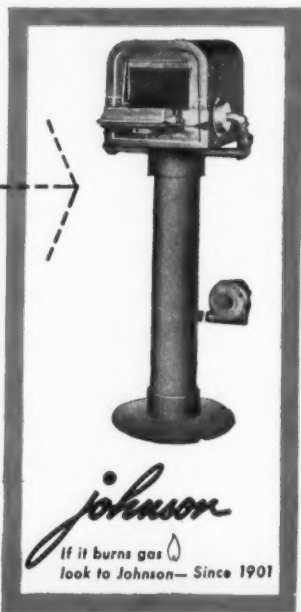
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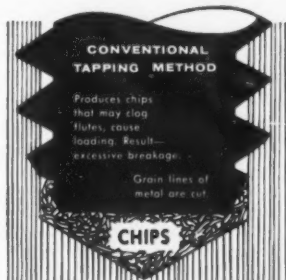
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BESLY X-Press Tapping is a cold forming or swaging process for producing internal threads in ductile metals. The desired thread is formed under pressure. The grain fibers follow the contour of the thread, as in good forgings. They are not cut away as in conventional tapping methods. Complete application details are available — see your Besly distributor, or send coupon. *Where this new tool can be successfully applied the results are phenomenal! It would pay you to try them yourself — NOW!*



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Tools, Blanks, Lapped Toss-away Inserts and Holders

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Your Name _____

November, 1958

modern machine shop 165

news of the industry

New plants and expansions . . . company name changes . . . new officers.

Edited by L. L. BALDHOFF

LODGE AND SHIPLEY APPOINTS CANADIAN DISTRIBUTOR

The Lodge and Shipley Co., Cincinnati, Ohio, has announced that it has appointed J. H. Ryder Machinery Co., Ltd. as distributor throughout the Dominion of Canada for the company's entire line of heavy duty precision lathes. The Ryder organization is said to be one of Canada's largest machinery distributors and has offices in Hamilton, Windsor, Winnipeg, Vancouver and Montreal.

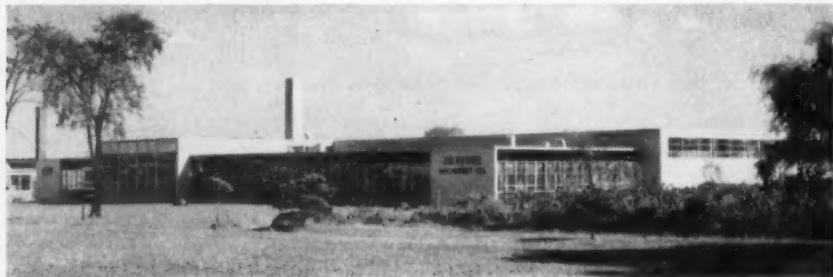
The Ryder firm will handle all sales and services of the English built Lodge and Shipley C.V.A. Powerturn Lathes. In addition, Ryder will also distribute the U.S.A. built Powerturn and Model X Tracer Lathes, toolmaker lathes, hollow spindle lathes, T lathes and, also, special lathes.

LINCOLN BUILDS PLANT IN AUSTRALIA

The Lincoln Electric Company (Australia) Pty., Ltd., a subsidiary of The Lincoln Electric Co., Cleveland, Ohio, is building a new plant for the manufacture of arc welding equipment and supplies.

The new plant is located in Sydney, Australia. It is modeled after Lincoln's Cleveland plant. The building is completely windowless and completely air conditioned with tempered air. Access to the plant is through two tunnels, one is an entrance for personnel and the other is a service way. In addition, there are shipping and receiving docks.

Plant layout is also similar to the Cleveland plant. All receiving docks are on the back of the building. Material flows through the various manufacturing processes to the front



Shown above is the large, modern layout of the J. H. Ryder Machinery Company, Limited office and service center, which is located in Toronto, Canada

of the building, where the shipping docks are located. The plant is divided approximately down the middle with one-half devoted to the manufacture of machinery and the other to manual and automatic welding electrodes and other consumable welding supplies. The office area is in the center of the plant, completely surrounded by the manufacturing facilities. Supervisory personnel can step out of the offices into the factory.

★ m m s ★

FELLOWS ELECTS BOARD CHAIRMAN

Russell M. Fellows, vice president and treasurer of The Fellows Gear Shaper Co., Springfield, Vt., was elected chairman of the board.

Mr. Fellows, son of the founder Edwin R. Fellows, joined the company in 1911. He was purchasing agent from 1916 to 1932, when he became assistant treasurer. In 1939 he was



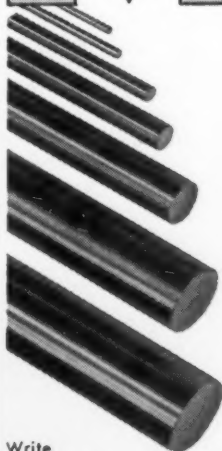
Russell M. Fellows

elected treasurer and a member of the board of directors. He has been vice president since 1945 and is a trustee of the company's Employees' Trust and Pension Plan.

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HI-DUTY DRILL CHANGES NAME

Hi-Duty Drill and Embroidery Works, Fleetwood, Pa., has been in-



The Aristocrat Line
of

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GROUND FLAT STOCK

OilCrat

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MarshallCrat

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WATER HARDENING (COMMERCIAL)

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BOX 108-M, LAGRANGE, ILL.

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Write for Catalog

of various types of precision measuring instruments for industry.

corporated as Hi-Duty Industries, Inc.

Mrs. Jennie C. Schwoyer, who has been associated with the firm since 1944, was elected president and treasurer of the new corporation. Samuel P. Smith, general manager since 1946, was elected vice president and Robert L. Smith was elected secretary.

The change in corporate structure of the firm, whose beginning dates back to 1903, was made because of the diversified operations planned for the future.

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CLEVELAND INSTRUMENT COMPANY MOVES

Announcement was recently made by The Cleveland Instrument Co., Cleveland, Ohio, that it expects to be in its new building, located at 6220 Schaaf Road (intersection of U. S. Routes 21 and 17), early in November. This modern brick one story building (located in an area which, because of its ready accessibility to the Freeway and metropolitan Cleveland, is rapidly becoming an industrial center) gives Cleveland Instrument Company the expanded space demanded by its fast growing business in the manufacture

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DREIS AND KRUMP EXPANDS PLANT

Dreis and Krump Manufacturing Co., Chicago, Ill., is meeting the increasing need for more assembly space for its larger press brakes and straight side type presses by constructing a new building. The building is 55 by 300 feet and will be serviced by a 25 ton overhead crane.

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LAMINATED SHIM ANNOUNCES NEW OFFICERS

In line with today's general optimism in industry is the announcement recently made by Laminated Shim Co., Inc., Glenbrook, Conn., of the election of a considerably expanded list of officers of the corporation. This augmented staff of executives was decided upon coincident with the completion of extensive additions to the plant and equipment, in view of the current business upswing.

The three principal officers elected were: Edward B. Nisbet, formerly



Cleveland Instrument Company recently moved into this new building in Cleveland

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HAMILTON

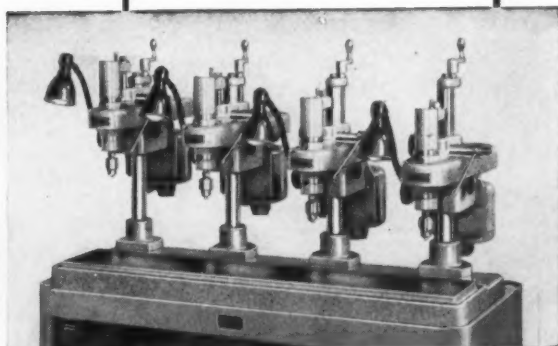
SUPER SENSITIVE, SMALL-HOLE

PRECISION

REPEAT

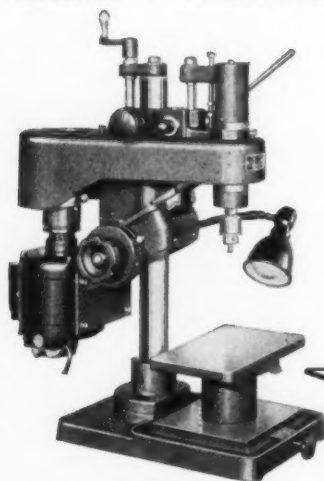
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“*for the finest work you do*”

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Designed and built to master the heart-breaking jobs which are so often attempted on drilling machines of "standard" accuracy.

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BULLETIN No. 2467

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2467

November, 1958

modern machine shop 169

news of the industry . . .



(Left) A. V. Anderson, (right) M. L. Lockwood

president, became chairman; A. V. Anderson who stepped up from executive vice president to president and general manager; Merle L. Lockwood advanced to executive vice president and director of sales. He had been vice president in charge of sales.

Other officers elected were: Richard Seipt, vice president in charge of engineering, research and development; Otto Hecht as vice president in charge of production; and Harold B. Swindells as treasurer.

Re-elected officers were: Frank P. Barrett as vice president and Frederick P. Craig as secretary.

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**EX-CELL-O ACQUIRES
GERMAN PLANT**

Ex-Cell-O Corp., Detroit, Mich., has acquired all of the outstanding capital shares of a machine tool firm in Germany. This step marks Ex-Cell-O's expansion into the third country outside of the United States.

The German company, Werkzeugmaschinenfabrik Goeppingen G. m. b. H., which is located in Goeppingen, Wuerttemberg, will operate as an in-

dependent subsidiary. It produces a line of lathes, medium size planers and textile looms.

An eleven acre site has been purchased in the adjoining city of Eislingen for the erection of a new manufacturing plant and office building. The new facilities will permit the German firm to manufacture on the Continent not only its own line of products, but also the products of Ex-Cell-O Corporation and its other subsidiaries.

★ ★ ★ ★ ★

industry news in brief . . .

Sheldon E. Young has been appointed Executive Vice President, Barrymount Corporation, wholly owned subsidiary of **Barry Controls, Inc.**, Watertown, Massachusetts.

Carl S. Walton has been appointed Product Metallurgical Engineer at the Customer Technical Service Station, Metallurgical Division, **Crucible Steel Company of America**, Pittsburgh, Pennsylvania.

Raymond O. Oyler has joined **Bunting Brass and Bronze Company**, Toledo, Ohio, as Director of Sales.

Frank W. Schreiner has been named District Manager at the Cleveland office, **Pratt and Whitney Company, Inc.**, West Hartford, Connecticut. He succeeds **Frank W. Harrison** who is leaving the company after 39 years of service. **Arthur C. Dade** has been named Cutting Tool and Gage Sales Manager for the Cleveland territory. **Alford H. Johnson** has been appointed Sales Manager, Cutting Tool and Gage Division. **William C. Mullin** will

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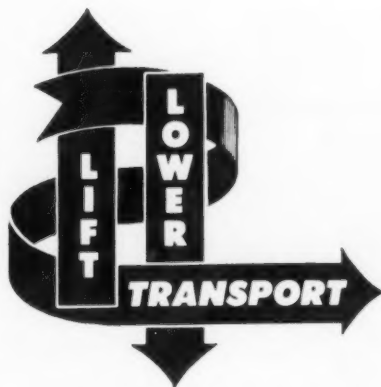
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A portable, height adjustable, steel table-truck-work bench! Used for die transfer, machine feeding, assembly (at best height, in best light). For lifting, lowering, transport of all compact, heavy loads. Saves "handling" accidents to both men and materials. Saves minutes for men wherever used.

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November, 1958

Recent changes and additions provide many bonus features.

Unobstructed perimeter
(work from any side!)

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Wheel
Models



Capacities to 5,000 pounds.

PORTELVATOR
The Handy HAMILTON Portable, Elevating Table

3 table surfaces
4 point support

Four
Wheel
Models



Special
Designs
tool

More Service
for Less Money than
Any other unit of equipment



ADDRESS

THE HAMILTON TOOL COMPANY
828 South Ninth Street
HAMILTON, OHIO

modern machine shop 171

industry news in brief . . .

manage instrument gage sales for the entire company.

The Sheffield Corporation, Dayton, Ohio, has announced that **Sheffield Central Sales Company**, 721 Springfield Street, Dayton, will service the Central and Southern Ohio and Kentucky areas. **Benton D. Witemeyer**

will head the new sales organization. **Chester Williams** will assist him, covering the Cincinnati-Louisville territory, and **Edmund Bachand** will cover Columbus, Lima and Mansfield, Ohio.

The Tool Crib, Minneapolis, Minnesota, has been appointed to cover the entire State of Minnesota and Douglas County in the State of Wisconsin, **The Taft-Peirce Manufacturing Company**, Woonsocket, Rhode Island. The

House of Tools, San Carlos, California, has recently been appointed to cover Northern California and Nevada.

Darling Machine Tool Company, 2186 Palou Avenue, San Francisco 24, California, has been appointed exclusive representative for Northern California, **Sidney Machine Tool Company**, Sidney, Ohio. **Machine Tool Sales Company**, 520 Park Avenue, Dallas 22, Texas and **Tri-Tex Machine and Tool Company**, 903 South 75th, Houston 22, Texas, have recently been appointed distributors.

Roderick L. Smith, formerly Abrasive Engineer in North Dakota, Min-

NEW DIXON AUTO-TORQUE Driver

SCREWS AND NUTS AUTOMATICALLY DRIVEN
WITH PRECISE TORQUE CONTROL

Gives you . . .

- 1 Complete control of screws from parts feeder to chuck, and until threads are started. No dependence on gravity to load the chuck.
- 2 Exclusive built-in sensing, which assures that a screw is driven. Automatically retracts driver only after proper torque has been attained.
- 3 Complete automatic cycle, requires only a touch of the pedal.
- 4 Torque accuracy within 5%, comparable to the most precise hand-torquing methods.
- 5 Clutch free-wheels after driving. Operator cannot vary the torque.
- 6 Two ranges of torque available: 0 to 84 inch-pounds and 48 to 120.
- 7 Work height adjustment, with 14" range, can be made without in any way disturbing the machine adjustments.

The new DIXON Auto-Torque Driver includes all the features of the DIXON Auto-Positioner, and has an efficient space-saving air motor with an adjustable-torque clutch. These features provide for positive handling, giving new efficiency in driving screws and nuts.

Full information available in bulletin No. SD-81.

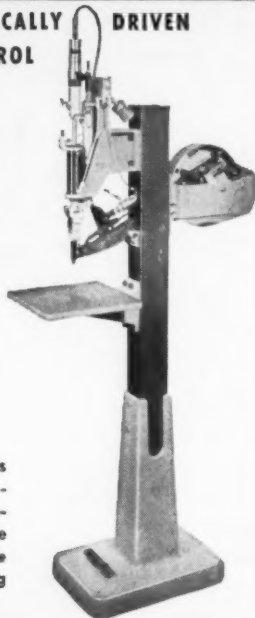
DIXON AUTOMATIC TOOL, INC.

2314 - 23rd AVENUE
ROCKFORD, ILLINOIS



EQUIPMENT FOR AUTOMATIC PARTS HANDLING AND ASSEMBLY

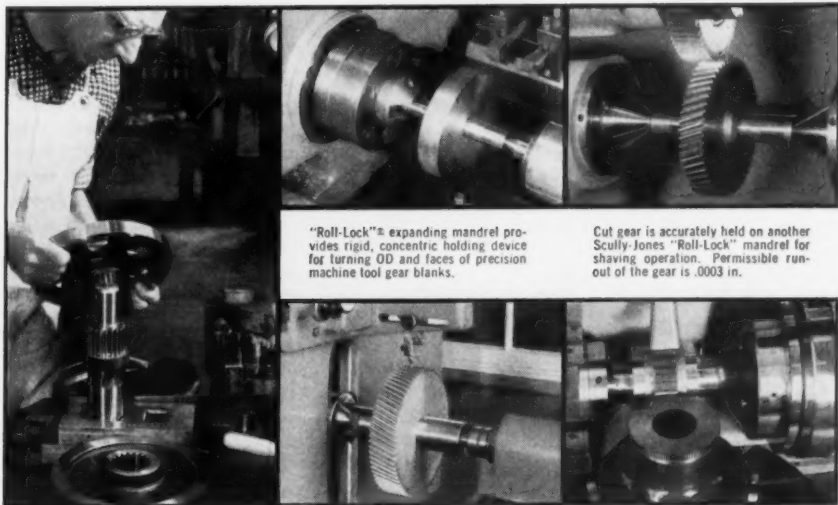
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Model SD-100, above, tooled for any standard screw up to $\frac{3}{4}$ " thread size. Special tooled units with multiple feeders available. Model SD-101, without floor column, provides a complete automatic station. Maximum width 6 inches.

New ways to hold gear blanks for precision machining and inspection

Easy-loading Scully-Jones arbors and mandrels provide rigid and accurate centering fit



"Roll-Lock"® expanding mandrel provides rigid, concentric holding device for turning OD and faces of precision machine tool gear blanks.

Cut gear is accurately held on another Scully-Jones "Roll-Lock" mandrel for shaving operation. Permissible runout of the gear is .0003 in.

Splined bore easily slips over pins on Pin-Cam mandrel. Slight rotation of blank forces pins into line contact with splines near pitch line.

Finished gear is inspected on a "Roll-Lock" mandrel. Gears can be machined and inspected on different mandrels without altering concentricity.

"Roll-Lock" arbor drives hob for cutting gears which are accurate within ten seconds of angular error. Ease of actuation simplifies shifting of hob.

Scully-Jones Pin-Cam and "Roll-Lock" arbors and mandrels increase precision by providing an even distribution of force around the bore (or against the faces of adjacent splines). They eliminate all play and accurately locate the gear or blank. Runout and wobble are reduced—especially important when turning and facing gear blanks which are stacked for hobbing.

"Roll-Lock" tools are a simple and fast method of creating a powerful centering fit. They eliminate tapered mandrels and arbor presses—permit transmission of torque and thrust required for heavy cuts. Runout is often less than .0001 in.

Gear blanks can be locked firmly

For more data circle 430 on Postpaid Card

on Pin-Cam mandrels, which apply equal force around the splined bore, eliminating play and accurately locating the part. Thrust from machining helps maintain pressure of the pins against adjacent splines. Pitch line of the cut gear can be held concentric to the splined bore. And there's no possibility of backing plates or collars springing the arbor and causing lead errors.

Scully-Jones and Company
1909 South Rockwell Street, Chicago 8, Ill.

**SCULLY
JONES**

**PRECISION
HOLDING
TOOLS**

Supervision simplified!

**NEW
REVISED
EDITION**

This book explains how foremen and executives may analyze their jobs and apply correct methods of handling supervisory problems encountered daily in their work. Clearly and concisely it covers all the typical jobs of hiring, reprimanding, firing, getting cooperation, delegating authority, training workers, etc. Revised to incorporate modern problems facing supervisors, this Fourth Edition includes information on such matters as automation, communication needs, and present-day stresses in human relations.

4th Edition Just Published

HOW TO SUPERVISE PEOPLE

By Alfred M. Cooper

Industrial Consultant and Training Specialist

Fourth Edition, 250 pages, 5 1/4 x 8 1/4, \$4.95

Send money order or check to:

Book Editor

MODERN MACHINE SHOP

431 Main St. • Cincinnati 2, Ohio

Here's how to end your wage incentive problems for good!

BETTER WAGE INCENTIVES

By PHIL CARROLL, *Professional Engr.*

A practical guide, in the popular Carroll style, telling how to set up and effectively maintain a good incentive program. Especially shows the various types of incentive grievances, how to prevent them, and what to do about them if they arise. Includes information on incentives for foremen, incentive arbitration, and economics of incentives. 256 pages, 6 x 9, 70 illustrations, \$4.75.

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Book Editor

MODERN MACHINE SHOP

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industry news in brief . . .

nesota and Wisconsin, has been appointed Field Engineer at the Indianapolis district office, **Norton Company**, Worcester, Massachusetts. Mr. Smith's former territory has been divided and will be handled by two Abrasive Engineers, **Edward A. Rogers** and **Carl Foltz, Jr.** Three former Field Engineers have been appointed Abrasive Engineers. **Robert W. Bennett** will now serve in Western Iowa, Eastern Nebraska and part of South Dakota. **John H. Hartleb** will cover Oregon and Northern California and **John H. Saunders** will call on accounts in Southwestern Pennsylvania and the Wheeling, West Virginia area. **Leo C. Johnson** has been appointed a Field Engineer at the Chicago office.

The **W. M. Pattison Supply Company**, 777 Rockwell Avenue, Cleveland, Ohio, has been named a distributor for Carmet, the carbide producing facility of **Allegheny Ludlum Steel Corporation**, Pittsburgh, Pa.

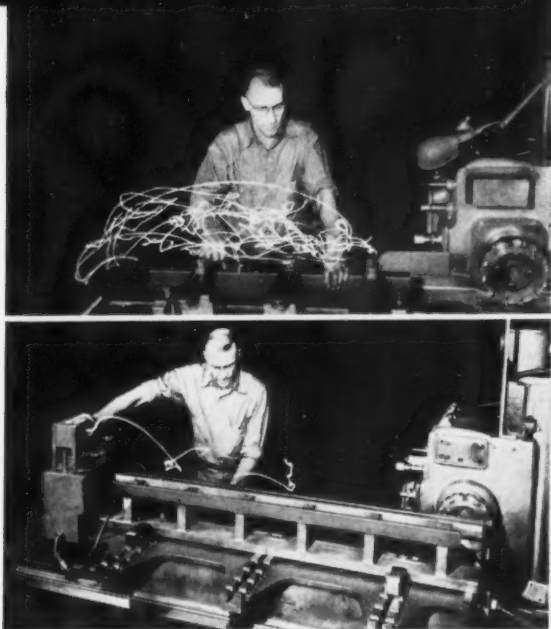
William J. Ryan has been appointed Assistant General Manager, **The Cleveland Crane and Engineering Company**, Wickliffe, Ohio. By action of the Board of Directors, he has also been elected Assistant Secretary. **Ralph K. Ford** has been promoted to Plant Superintendent.

More Information?

For additional information on any product mentioned in this issue, please use the READER SERVICE CARDS opposite pages 32 and 292.

MAJOR TIME SAVINGS

...result
from
shift to
magnetic
clamping



Wrist lights tell the story in these two photos. The job is the same—only the clamping method changes. Note how the excessive motion required with mechanical clamping (top view) is eliminated with the change to Sundstrand magnetic clamping (lower view).

Longer tool life, greater clamping uniformity, and a significant reduction in operator fatigue are a few of the outstanding benefits you are sure to get with magnetic clamping. A quick check on its application to your jobs will show you others.

FREE DATA about Sundstrand magnetic clamping fixtures is available in Bulletin 597-M. Write for your copy today.

SUNDSTRAND



**SUNDSTRAND
MACHINE TOOL CO.**
Magnetic Products Division
2531 ELEVENTH ST., ROCKFORD, ILLINOIS



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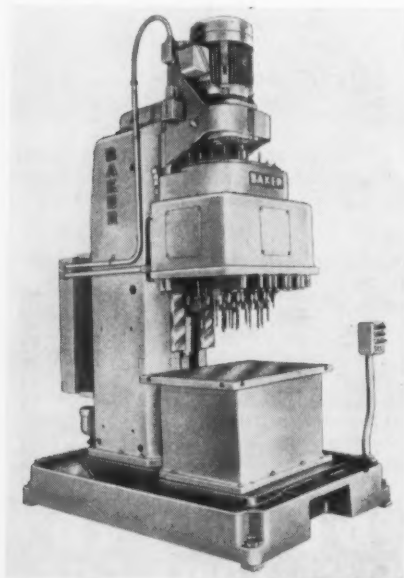
November, 1958

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***Descriptions of new machines, tools
and materials for metalworking.***

**HYDRAULIC DRILLING
AND TAPPING MACHINES**

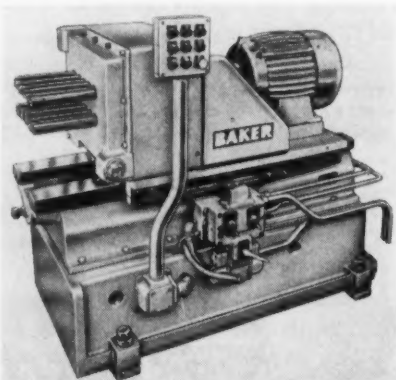
A completely new line of hydraulic machines, for every drilling and tapping operation, has been announced by Baker Brothers, Inc., 1000 Post St., Toledo, Ohio. New standard adjustable spindle heads can be specified for all models of these machines.



Shown with one of 21 sizes of adjustable spindle heads, this Baker Vertical is available with strokes of 18 or 27 inches.

Both vertical and horizontal machines are included in this line, each in capacities and with interchangeable drilling heads to meet nearly every production need. Verticals are available with way widths of 12, 18 and 24 inches for 7½, 15 and 30 h.p., respectively. All are supplied with either 18 or 27 inch strokes.

According to the manufacturer, heavy emphasis was put upon the interchangeability of components and spindle heads in designing these machines. For the basic machines, a total of 21 different sizes of standard adjustable spindle heads can be applied. Fixed center heads, with standard



Baker Horizontal Unit with fixed center head. Machines have been designed to accommodate any of approximately 27 fixed center heads.

Edited by L. L. BALDHOFF

housings and gear trains, and spindle locations custom bored to fit the specific job, are available in approximately 27 different models. In addition, there is a choice of six power index tables, in sizes to 60 inches in diameter. Machines are so designed that these index tables can be mounted directly on the base.

Bare horizontal units are also available in way widths of 12, 18 and 24 inches. Each of these is standard with 18, 27 and 40 inch strokes. The full selection of fixed and adjustable heads for the vertical machines can also be applied to the horizontal units.

In addition to full flexibility and minimum retooling costs, the manufacturer states that the machines have been designed to provide easy maintenance and reduced parts stocking requirements. All electrical and hydraulic controls are located on the outside of the units for easy accessibility. All units in the line meet both J.I.C. and N.M.T.B. standards.

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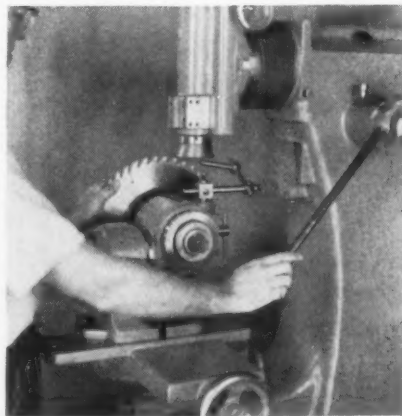
★ modern machine shop ★

MACHINE FOR SHARPENING CIRCULAR SAWS

Wood and metalworking plants using circular saws can save money by doing their own sharpening. A major tool for this purpose is the Ace Grind-

ing Machine, manufactured by the Oliver Instrument Co., 1430 East Maumee St., Adrian, Mich. The Oliver Ace represents a small investment and users can sharpen carbide tipped and high speed steel circular saws on their own premises. The machine is extremely simple to set up and use and has been designed to bring the grinding wheel to the saw, thus providing an accurate grind. The machine can also be used for sharpening other wood cutting tools, as well as face mills, reamers, hobs, spotfacers, straight and spiral cutters and all general purpose tools.

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Oliver Ace Grinding Machine is shown in use

new shop equipment . . .

HYDRAULIC EXPANDER

A metalworking machine, that develops more than 1,580 tons of force and stretches a steel ring weighing over 1½ tons with about the same ease that a housewife forms pie dough, was recently announced by Grotnes Machine Works, Inc., 5454 North Wolcott Ave., Chicago 40, Ill. The company recently conducted a demonstration that included the expansion of a part 60 inches in diameter, 26 inches in height and with a 2-inch thick wall, which was expanded and sized to within 0.010 inch of a true circle. The entire operation, taking only one minute, was performed cold with no heating of the part, the power applied being so great that the metal flows cold to the desired size and diameter. Since an accuracy of plus or

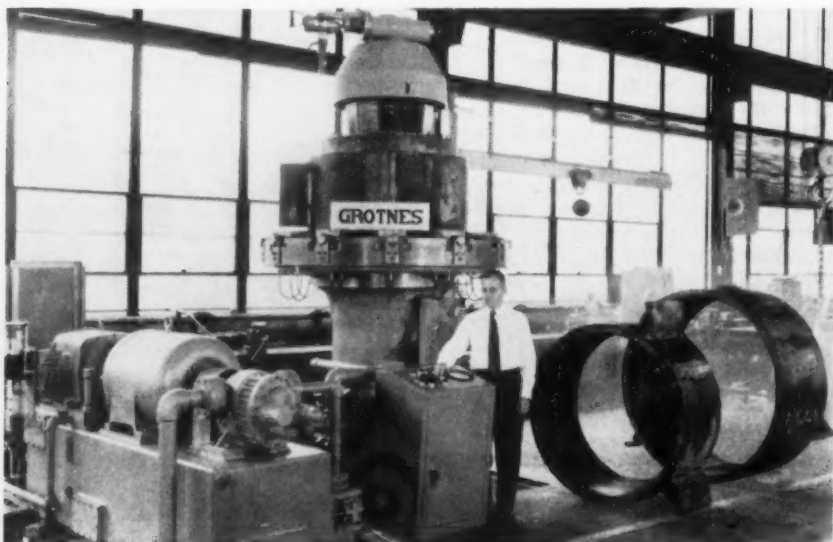
minus 0.010 inch on the diameter can be obtained by expanding, the stock thickness of a typical part was reduced from 2½ to 2 inches with proportionate reductions in stock cost and handling time. A rough turning operation, which consumed 70 minutes to remove approximately ½-inch of wall thickness to obtain the necessary roundness, was eliminated.

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AUTOMATIC CENTERLESS TURNING MACHINE

Taber Instrument Corp., 111 Goundry St., North Tonawanda, N. Y., is now marketing the Karge Turnomat Automatic Centerless Turning Machine. This machine is claimed to have the ability to: (1) centerless turn in one pass with one plunge-cut the largest bar stock within the capacity of the machine and turn it to



Grotnes No. 40-H-1580 Hydraulic Expander develops over 1,580 tons of force



Karge Turnomat Centerless Contour Lathe



Beko Dynamic Balancing Machine

near needle-point diameter; (2) automatically produce workpieces of infinite lengths, tapers and contours; (3) produce precision workpieces with fine machine finish to within a tolerance of 0.0005 inch; and (4) economically produce long or short runs of parts because all turning operations are accomplished with single point cutting tools.

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DYNAMIC BALANCING MACHINE

Balance Engineering Co., 5050 West Lake St., Chicago 44, Ill., recently announced that all Beko Dynamic Balancing Machines are now arranged to provide completely automatic angle indications. A single knob constitutes the only operating control. Moving the knob to the left automatically produces simultaneous indications of both magnitude and angular position of unbalance correction required for the left end of the rotor. Flipping this

same knob to the right produces simultaneous amount and angle indications for the right end of the rotor. When released, the control knob returns to neutral position for workpiece loading.

Magnitudes of unbalance are provided directly in terms of correction procedure selected by a large scale, easily read meter. Angular positions of required corrections are positively indicated by a powerful stroboscopic lamp, synchronized to illuminate the rotor workpiece, so that angular positions of corrections are always directly at the top of the rotor.

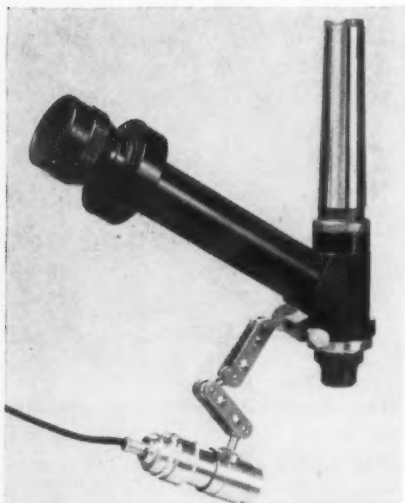
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MICROSCOPE FOR JIG BORER

Opto-Metric Tools, Inc., 137MMS Varick St., New York 13, N. Y., has announced an instrument which has been specially designed as a locating microscope in jig borers and similar precision machine tools. Optically it

new shop equipment . . .



Leitz Microscope designed for jig borers

combines at 25x total magnification a fairly large field with sufficient power of observation. The eyepiece contains a hairline cross and is adjustable for individual focusing. Standard shanks are $\frac{1}{2}$ inch straight, No. 2 and No. 3 Morse Taper. As a novel feature, a flexible spot illuminator is available for independence from shop lighting conditions.

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COUPLING TAPPING MACHINE

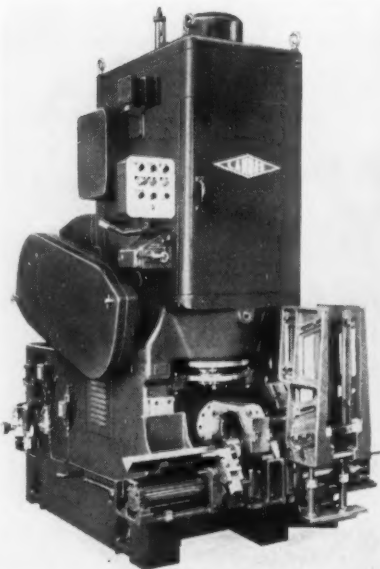
Landis Machine Co., Waynesboro, Pa., has introduced its 77TA Automatic Coupling Tapping Machine, which has been designed for the high production precision internal threading of oil tubular and commercial

couplings ranging from $2\frac{7}{8}$ inch drill pipe external upset to $9\frac{5}{8}$ inch, long thread, casing couplings. Pneumatically operated and electrically controlled, only visual inspection and magazine loading is required by the operator.

Production rates range from fifty-six $3\frac{1}{2}$ inch line pipe couplings tapped at 37 s.f.m. to eleven $9\frac{5}{8}$ inch, long thread, casing couplings threaded at 27 s.f.m. Also, standard merchant and many special couplings can be tapped on a high production basis.

Ten spindle speeds, ranging from 7 to 56.8 r.p.m. are obtainable by changing the vee belt drive pulleys when using an a.c. constant speed motor. However, the machine can be supplied with either an a.c. mechanical vari-drive or d.c. variable speed motor, allowing adjustable spindle speeds ranging from 4.5 to 54 and 6.5 to 53.5 r.p.m.'s, respectively, to be obtained.

For more data circle 77 on Postpaid Card



Landis 77TA Automatic Coupling Tapper

TRI-PURPOSE HONING MACHINE

A tri-purpose honing machine, which embodies many new features, has been announced by Superior Hone Corp., 1615 Elreno St., Elkhart, Ind. Designated as the Model "AM," this modern, streamlined equipment combines the rugged dependability and economical precision and speed which make it ideal for production runs, toolroom work and salvage operations. It measures only 48 inches high, 28 inches wide and 36 inches deep.

The machine features infinitely variable speeds of from 250 to 1,400 r.p.m. of the sealed ball bearing spindle. A tachometer is provided for accurate setting of speeds. A dial indicator is also available, in addition to a large disc clutch and disc brake. Another important feature is a 14 gallon capacity coolant tank, which is removable for easy cleaning.



Superior "AM" Tri-Purpose Honing Machine

The drive, coolant tank and $\frac{1}{2}$ h. p., 110 volt, 60 cycle, single phase motor are completely enclosed in the heavy steel base, which has a louvered cover to provide ample ventilation. For more data circle 78 on Postpaid Card

★ modern machine shop ★

COMPARATOR ALLOWS FOR INSPECTING SECTIONS WITHOUT CUTTING THE WORKPIECE

A new 14 inch optical section comparator, designed for inspecting edge contour sections, has been developed by the Jones and Lamson Machine Co., Dept. 710, 521 Clinton St., Springfield, Vt. It incorporates two high intensity illuminating units which produce collimated light. These are mounted on the hood of the machine. The manually operated blade orienting fixture has an adjustable locating vee and built in knife edge.

The collimated light is projected past the knife edge onto the blade held in the locating vee. The straight line shadow thus formed is inspected, on



J and L 14 Inch Optical Section Comparator

FASTER FEEDS WITH... SUPERBORE

THE
COUNTERBORES
WITH

Standard

$\frac{1}{64}$ " *Oversize*

$\frac{1}{32}$ " *Oversize*

AVAILABLE FROM STOCK
FOR EACH SCREW SIZE

30° Right Hand Spiral, 4 Flute
Now you can speed up production 100% with our *New* 30° fast right hand spiral, four-flute counterbores.

You will find that faster feeds are possible with this freer-cutting tool.

Hardened counterbore blanks in stock can be ground to any special pilot and flute diameters in one week.

Free Complete Reamer catalogue with world's Greatest Reamer selection by the Thousands and thousands.



Write for it today!

In Emergency
Telephone:
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**TWENTIETH CENTURY
MANUFACTURING CO.**

ROUTE 176 and BRADLEY ROAD
BOX 429 LIBERTYVILLE, ILL.

For more data circle 432 on Postpaid Card

182 modern machine shop



new shop equipment . . .

the viewing screen, as a cross sectional view of the blade edge contour. By moving the blade to and from the lens, the edge contour may be inspected along the entire length of the blade. For more data circle 79 on Postpaid Card

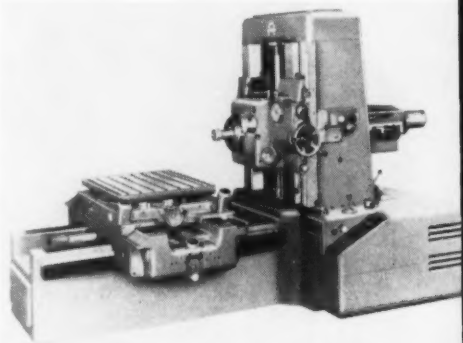
★ modern machine shop ★

OPTICAL JIG BORER

M. B. I. Export and Import, Ltd., 475 Grand Concourse, Bronx 51, N. Y., has introduced the Dixi 75 Horizontal Optical Jig Borer. This machine offers greater capacity for jig boring with optical interrelationship between bores at all angles.

The 3 inch spindle and 8 h.p. drive provide jig boring accuracy with heavy cutting capacity. Projected optical settings provide direct readings of 0.00005 inch for linear motions and 1 second of arc for the rotary table.

This machine also features: larger table and travels; separate reservoir and recirculating lubrication for the headstock; electrically interlocked hydraulic motions; increased spindle speeds; simplified functional controls. For more data circle 80 on Postpaid Card



Dixi 75 Horizontal Optical Jig Borer

November, 1958

Both NEW and DIFFERENT SHELDON 15" PRECISION LATHES



NEW

New. Revolutionary double-box Headstock (Pat. Pend.)

New. "WORK-HOLDING ONLY" Spindle.

New. Single-Shift Back Gear Lever on Headstock.

New. Headstock and Apron running in oil.

New. 1½" Hole through Spindle.

New. 60-pitch Gear Box with built-in Lead Screw Reverse.

New. Amazing LOW PRICE.

DIFFERENT

Different. Spindle rigidly held in two large "Zero Precision tapered roller bearings arranged in box-type design.

Different. Electrical switches and push-button stations fully enclosed in built-in well in headstock.

Different. Two independent clutches in apron for selecting power feeds.

Different. Cam-action tailstock clamp for rapid release and instant locking of tailstock.

Different. Triple, cogged, V-belt outboard drive—eliminates intermediate shafts—delivers more power to spindle.

\$2350.00 base price
F.O.B. Factory
(Less Electricals)

This is an all new lathe that bridges the gap between conventional belt driven and geared head lathes. It combines the capacity and power of a geared head with the economy and flexibility of a belt driven lathe. Available with 5', 6' and 8' bed lengths providing 31", 42" and 66" center distances.

Send in Coupon
for full information ↓

SHELDON MACHINE CO., INC. 4250 No. Knox Ave., Chicago 41, U.S.A.

Gentlemen: Please send me information on items checked.

- ☐ The NEW and DIFFERENT SHELDON 15" Lathes
☐ Sheldon ☐ 10" ☐ 11" ☐ 13" Lathes
☐ 11" and 13" Variable Speed Lathes
☐ High Speed Turret Lathes
☐ Sebastian 13" and 15" Geared Head Lathes
☐ Horizontal Milling Machine
☐ Sheldon 12" Shaper
☐ Name of Local Dealer
☐ Have Representative Call

Name _____ Title _____
 Company Name _____
 Street Address _____ ☐ Company
 City _____ ☐ Home
 State _____

For more data circle 433 on Postpaid Card

new shop equipment . . .

HEAVY DUTY PUNCHES

Heavy duty solid head type punches are available from Ring Punch and Die, Inc., 11 Fenton Place, Jamestown, N. Y. These punches are stocked in two grades of high quality tool steels and can be supplied in round, square, oblong or rectangular points. Odd shapes can be furnished to specification. For more data circle 81 on Postpaid Card



Ring Heavy Duty Punch

MARKING MACHINE FOR CYLINDRICAL AND FLAT PARTS

Twist drills, hammers, pistons, bevel gears, hose fittings and shells are

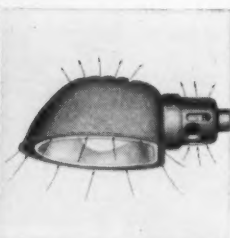
among the types of cylindrical components that can be marked on the Model E.P. 34 General Purpose Marking Machine, available from Pryor Marking Products, 434 South Wabash Ave., Chicago 5, Ill. This unit is also suited for marking certain types of flat stock. It is a hand operated

DAZOR FLOATING LAMPS

**Fit the Lighting
to Each User
and Each Job**



Top-Mounted Reflector



Side-Mounted

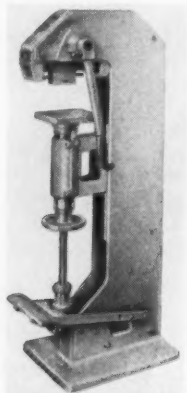
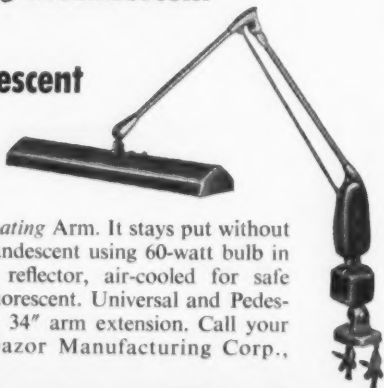
Air-Cooled Incandescent

or

Fluorescent

People . . . jobs . . . lighting needs differ. Let each employee control light location

with the Dazor *Floating Arm*. It stays put without locking. Choice of Incandescent using 60-watt bulb in top- or side-mounted reflector, air-cooled for safe handling; or 2-tube Fluorescent. Universal and Pedestal models with 24" or 34" arm extension. Call your Dazor distributor. Dazor Manufacturing Corp., St. Louis 10, Mo.



Pryor General Purpose Marker

For more data circle 434 on Postpaid Card

NEW LOW COST LEAD SCREW TAPPER



with...

**PUSH
BUTTON**

operating
control

- Produces Gauge Perfect Parts
- Eliminates parts spoilage, inspection
- Saves Taps, Reduces Fixture Costs
- Fast, Economical, 6-way Operation

Here is truly the most accurate, most precise, cost-cutting tapper on the market! New, different, flexible, it can be operated with push button and foot control for cycle or jog, automatic or with switch in fixture for full cycle. Either way, it provides a uniformity, speed and precision accuracy that's unparalleled!

Here are just a few features:

- uniform threads in any pitch from 20 to 96.
- positive depth stop.
- depth stop holds uniform depth to within .005".
- tap capacity 0" to 3/16" in steel.
- lead screw travel 1 3/16".
- "safety return" stops tapping instantly.

Easy to Operate — Pays for Itself!

Push button releases electrically controlled air pressure engaging sensitive friction clutch which actuates lead screw. The tap, completely controlled by lead screw, is fed gently,

automatically without pressure. The result is repetitive uniformity and precision that never varies! Tests proved all tapped parts passed 100% inspection —without rejects!

Procunier

Send for FREE Brochure

giving the full story of this amazing new tapping unit. See how you can enjoy higher quality tapping, less tap breakage, parts spoilage and increase tapping efficiency—for less cost! Write today!

**PROCUNIER
SAFETY CHUCK CO.**
12 S. CLINTON ST., CHICAGO, ILL.



PROCUNIER SAFETY CHUCK CO., Dept. 11
12 S. Clinton St., Chicago, Ill.

Gentlemen: Please rush me your FREE brochure on the new Lead Screw Tapping Attachment.

NAME _____
ADDRESS _____
CITY _____ STATE _____

For more data circle 435 on Postpaid Card

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machine that is readily adjusted to accommodate various sizes and shapes of work to be marked. It uses interchangeable steel type or solid made to order dies.

For more data circle 82 on Postpaid Card

★ modern machine shop ★

15 INCH PRECISION LATHE

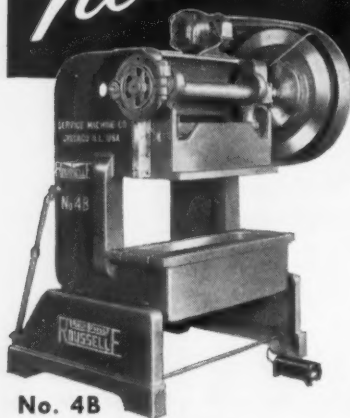
An all new 15 inch lathe, designed to fill the gap between conventional belt driven and geared head lathes, has been announced by Sheldon Machine Co., Inc., 4250 North Knox Ave., Chicago 41, Ill. This 15 inch lathe offers modern, big capacity fea-



View of Sheldon 15 Inch Precision Lathe

tures. It combines the capacity and power of a geared head lathe with the

***New* 40-TON DOUBLE CRANK O. B. I. ROUSSELLE**



**No. 48
ROUSSELLE PRESS**

**WITH NEW ELECTRICALLY
CONTROLLED AIR CLUTCH**

- "Plug-in" foot and hand controls.
- Single stroke, continuous and jog selector.
- Low air consumption.
- Large die area.
- Roller bearing flywheel.
- Bronze main and crank bearings.

CHOICE OF 30 SIZES AND TYPES IN 5 TO 40-TON PRESSES



SERVICE MACHINE CO.

Mfrs. of Roussele Presses
2310 WEST 78th STREET • CHICAGO 20, ILL.

ROUSSELLE PRESSES ARE SOLD EXCLUSIVELY THROUGH LEADING MACHINERY DEALERS

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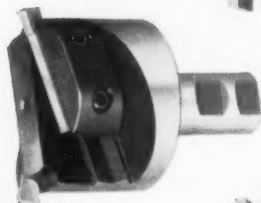
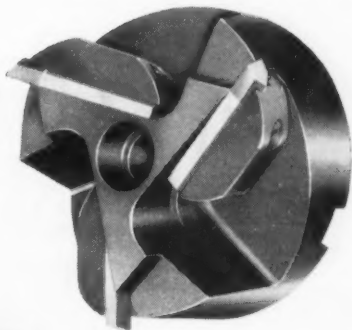
NEW

OFFERS . . .

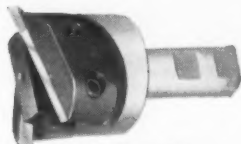
- ★ CARBIDE
INSERTS
- ★ SHEAR CUT
ACTION
- ★ MORE
USEABLE
CARBIDE
- ★ IT'S ECONOMICAL
TO BUY AND
MAINTAIN
- ★ QUICK SETTING
GAGE INCLUDED

Manchester MILLING CUTTERS

M-50
5" dia. cutter
(with 1-1/2" dia.
pilot hole)
3, 3/8" wide
carbide inserts



M-35
3-1/2" dia. cutter,
1-1/4" dia. shank,
2 carbide inserts
1/4" or 3/8" wide



M-25
2-1/2" dia. cutter,
3/4" or 1" dia. shank,
2 carbide inserts
1/4" or 3/8" wide

The new Manchester P.D.Q. Milling Cutters are made of heat treated alloy steel and are designed to handle the "tough jobs". Inserts may be changed in the machine. Exclusive double "V" clamp automatically registers the cutting tools. Designed for low H.P. machines. Special shanks available on request. Write for literature.



PORTAGE Double-Quick, Inc.

1041 SWEITZER AVENUE • AKRON 11, OHIO

For more data circle 437 on Postpaid Card

November, 1958

modern machine shop 187

new shop equipment . . .

economy and flexibility of a belt driven lathe.

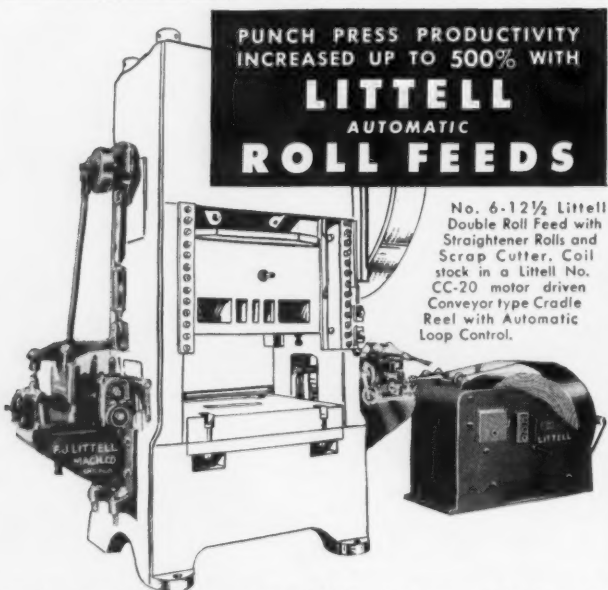
The most significant new design feature is the fully enclosed headstock with its "Work Holding Only" spindle. Although the high torque drive is direct to the spindle, all radial and thrust loads from the drive are absorbed by large tapered roller bearings,

supporting an input pulley in the rear of the headstock wall. Power is then transmitted to the spindle through a positive lock clutch in direct drive, or through gears in backgear drive. As a result, the spindle can utilize its full capacity as a workholder without the stresses of drive pressures or the loss of power inherent in machines with intermediate shafts.

The spindle itself is mounted in "Zero Precision" tapered roller bearings, arranged in the new box type design for greater accuracy and maximum rigidity. The hole through the spindle is 1½ inches in diameter.

Because of the unique design of the headstock, backgears can be engaged or disengaged by a single lever which is on the front of the headstock. A 3 horsepower motor is recommended for the high torque drive, which transmits power from the motor through a countershaft, direct to the spindle.

In addition to the powerful drive and headstock, this 15 inch precision lathe features a one piece, double walled apron with all parts running in oil. The apron has two independent drop



No. 6-12½ Littell Double Roll Feed with Straightener Rolls and Scrap Cutter. Coil stock in a Littell No. CC-20 motor driven Conveyor type Cradle Reel with Automatic Loop Control.

Production per press increases up to 500% when automatic feeding with Littell Roll Feeds replaces hand feeding. The savings in handling and storage of coil stock added to the economies of faster production produce an automation dividend. Littell Roll Feeds in a wide range of sizes and models handle stock up to .156" maximum thickness and up to 72" maximum width at speeds of 50 to 250 strokes per minute. Lengths fed per stroke range up to 50". Standard Littell Automatic Feeds serve all types and sizes of presses.

WRITE FOR LITTELL CATALOG SECTION "A"

F.J. LITTELL
MACHINE CO.
Speed with Safety

ROLL FEEDS • COIL CRADLES
STRAIGHTENING MACHINES
REELS • AIR BLAST VALVES
District Offices: Detroit, Cleveland

4163 N. RAVENSWOOD AVE., CHICAGO 13, ILL.
For more data circle 438 on Postpaid Card



**GRINDING
METHODS**

How would you machine castings like these?



You can grind and save time on a Mattison "No. 153"

Every shop—large or small—can do a variety of jobs at surprisingly low cost on the Mattison No. 153 vertical-spindle disc grinder. In your foundry, on the assembly floor, and right on the production line, there are opportunities to produce better work and increase efficiency with this general-purpose machine.

You can quickly finish large bossed surfaces on doors, covers, and similar parts not requiring high-dimensional accuracy. But even more important, you can pre-grind parts which are held on magnetic chucks for milling or finish grinding. The

smooth surface so easily produced by a "No. 153" is a better holding surface and eliminates warpage for more accurate machining.

The Mattison "tub grinder" is built to last, with heavy-duty thrust bearing rated at 25,000 lb, sturdy cast iron wheel dresser head, and 25-hp spindle motor. It has a 53-in. diameter wheel with *eight* 1" or 2" thick segments, making it easy to handle and replace wheels at minimum cost.

MATTISON MACHINE WORKS

Rockford, Illinois

Phone 2-5521

For more data circle 439 on Postpaid Card

November, 1958

modern machine shop 189

new shop equipment . . .

lever clutches for engaging power feeds. The clutches can be engaged singly or in combination and are completely adjustable for varying work conditions.

This lathe is available with either 5, 6 or 8 foot bed lengths, providing 31, 42 or 66 inches between centers. For more data circle 83 on Postpaid Card

CONCENTRIC PUMP

Star Jack Co., 420 Lexington Ave., New York 17, N. Y., now has available a hydraulic Hi-Lo Pump, which features automatic changeover from high speed low pressure to low speed high pressure. Made entirely of steel, the Hi-Lo Two Speed Pump is available with five combinations of pistons, designed for hand and foot operation with a single lever or pedal. At the

start of the operation, until a predetermined pressure has been reached in the hydraulic system, the high speed piston delivers a large volume of oil per stroke and raises the ram with utmost speed (as much as 22 times faster than at high pressure). At that point, an internal bypass

Save Money...Save Time

by using

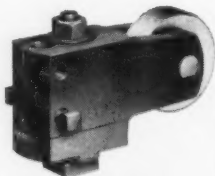
STANDARDIZED

THREAD ROLLS

for Single Thread Roll Applications

Both tool engineers and purchasing departments appreciate the saving of time, effort and money made possible by being able to order Reed standard thread rolls and holders by type number only, without the necessity of submitting drawings and specifications.

These standard rolls with the new Reed Single Roll Holders provide a complete package of simple thread rolling tools for single roll applications.



Thread Roll Holders for
Single Roll Applications
6 SIZES IN STOCK

**ROLLS for COMMON STRAIGHT THREADS
and TAPER PIPE THREADS
CARRIED IN STOCK**

For Your Convenience in Ordering
Standardized Thread Rolls and Holders

Write for Thread Roll Bulletin 1-16 and Price List

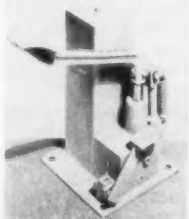
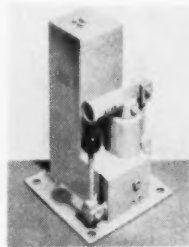
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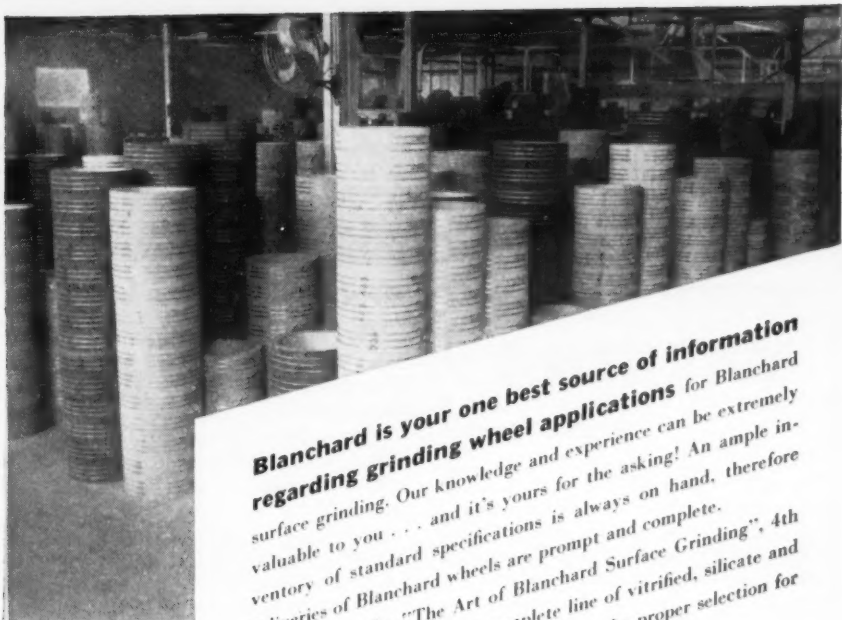
REED ROLLED THREAD DIE CO.

Specialists in Thread and Form Rolling Tools and Equipment
Worcester 1, Mass., U.S.A.

For more data circle 440 on Postpaid Card



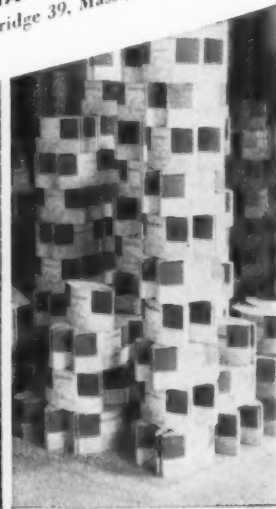
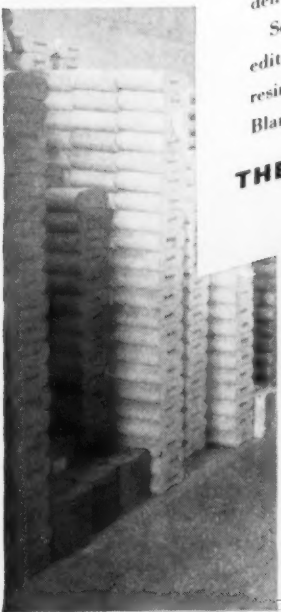
Star Concentric Pump



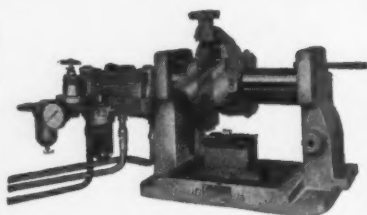
Blanchard is your one best source of information regarding grinding wheel applications for Blanchard surface grinding. Our knowledge and experience can be extremely valuable to you . . . and it's yours for the asking! An ample inventory of standard specifications is always on hand, therefore deliveries of Blanchard wheels are prompt and complete.

Send today for "The Art of Blanchard Surface Grinding", 4th edition, which describes the complete line of vitrified, silicate and resinoid bonded wheels and segments and the proper selection for Blanchard vertical spindle surface grinders.

THE BLANCHARD MACHINE COMPANY
 64 State Street Cambridge 39, Mass., U. S. A.



For more data circle 441 on Postpaid Card



PRECISION MARKING at low cost

The ACROMARK Model 9A Marking Machine provides a fast means for marking steel, other metals and materials by the "line contact method". It essentially eliminates poor markings or inaccuracies. Your shop air line provides the power (75 p.s.i. and up) and the operation is quiet with no stamping or jarring problems.

ACROMARK Model 9A Machines are standard with strokes from 6" to 14". Clearance under head is from 6" to 7 3/4" front, 3 1/2" to 5" rear. Back is open for extending parts or high production line adaptation. Hand and Motor models also standard. Famous for wide adaptability and long life.

"Inventors and manufacturers of more than 300 kinds of marking machines — largely standardized. Specify ACROMARK to get the right machine for the job."

Write now for Catalog No. 9 and send sample or sketch of parts to be marked for engineers' recommendation—without obligation. We furnish dies, machine and everything.

The
ACROMARK
Company

9 Morell St., Elizabeth 4, N. J.

"THE ORIGINAL MARKING SPECIALISTS"

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192 modern machine shop

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valve opens and the task is automatically shifted to the high pressure piston, which works alone to generate 10,000 p.s.i. or over.

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IMPROVED LIFTER

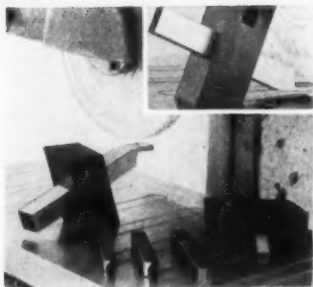
Economy Engineering Co., 4507 West Lake St., Chicago 24, Ill., has announced that the Type D Shoplifter—now the new Type D, Mark II—has been completely redesigned into a stronger, larger capacity lifter.

The capacity of the Type D Shoplifter, Mark II has been increased from 500 to 750 pounds. This weight can be handled safely anywhere on the unit's one piece, backguarded 24 inch square steel platform. Only 2 feet



Economy Type D Shoplifter, Mark II

November, 1958



SPELLMACO TOOL GRINDING FIXTURE

A quick, easy, accurate way to grind or sharpen a cutting tool.

This fixture can be used for all size bits $\frac{1}{2}$ " or smaller. No complicated settings to make. Precision ground. Heat treated for long life. Only \$9.95 each.

R. L. SPELLMAN CO. • URBANA, OHIO

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SPELLMACO "SPOTTERS"

A matched set of transfer punches for toolmakers, machinists and tool cribs

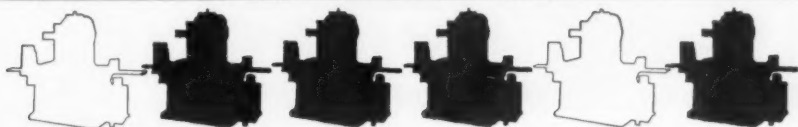
Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black oxide finish.

SET #3-17; 28 punches with indexed stand—sizes $\frac{3}{32}$ " to $\frac{1}{2}$ ", by $\frac{1}{44}$ "—plus handy $\frac{17}{32}$ " size. Length $4\frac{7}{8}$ ". ONLY \$17.90. Single sizes available

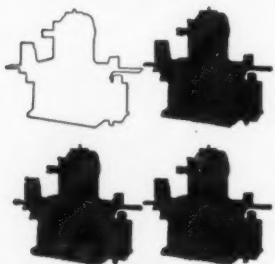
R. L. SPELLMAN CO. • URBANA, OHIO

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GRAND RAPIDS GRINDERS...



— are purchased by firms already owning one or more of them. Three out of every 10 sold go to new customers. Once you've enjoyed the advantages of a Grand Rapids Grinder in your plant, chances are, like so many present users, you'll surely want more of them.

Write for 24-page book that tells you why.



GALLMEYER & LIVINGSTON CO.

408 Straight Ave., S.W.

Grand Rapids, Michigan

new shop equipment . . .

wide, the unit can be handled easily in narrow aisles and congested areas for lift duties up to 54 inches.

Numerous standard safety features include slip proof twin dogs for balanced load security, top sheave cable guard, extra hoist drum cable wraps and a foot operated floor lock.

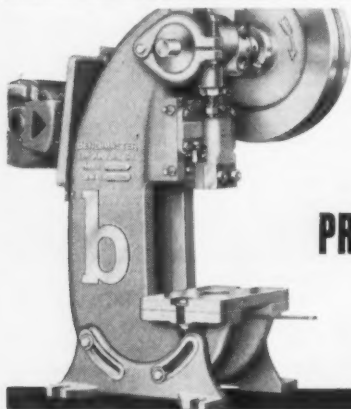
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**SELF-MASTERING DIAL
COMPARATOR AND
DIAL INDICATOR CHECKER**

A precision measuring comparator, that can be set in less than one minute to check small parts without the need for setting masters or gage blocks, has been announced by Go-Devil Instrument Co., 624 Dutchess Turnpike, Poughkeepsie, N. Y. Wide spaced 0.0001 inch graduations on the setting dial permit setting to 0.000025 inch or

closer. It uses any dial indicator and checks its own indicator. The range is zero to 1 inch. The anvil is $\frac{1}{4}$ inch in diameter. This Go-Devil Monitor also checks the accuracy of more than 300 different makes, models and sizes of dial indicators. It checks any indicator to an accuracy of 0.000025 inch in less than two minutes. In addition, it will check special long ranges up to 1 inch.

This instrument has been designed



**THERE'S A
BENCHMASTER
FOR EVERY
PRESS OPERATION**

**at ratings from
2 to 10 tons!**

Benchmaster gives you a series of proven presses and press designs—backed by 20 years of industrial use—with stock parts and dealers from coast to coast!

Benchmasters are the *accepted* presses — standards of the industry for all light tonnage applications.

Made in 2, 5, 8 and 10 ton capacities in Plain OBI, Back-Geared, Deep Throat, Fixed Bed Gap Frame, Multiple Ram and Half Press models with mechanical, air or electric clutches. Also available: Mechanical 2 hand trip lever or 2 hand solenoid operation for maximum safety.

When you need a press for *any operation*, check with Benchmaster... *known for service, for reliability... for over-all press versatility, and for low cost!*

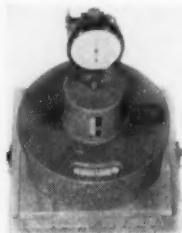


World's largest
manufacturer of small punch
presses and mills.

benchmaster

1835 W. Rosecrans Avenue • Gardena, California
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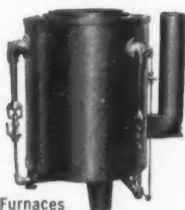


Go-Devil Monitor

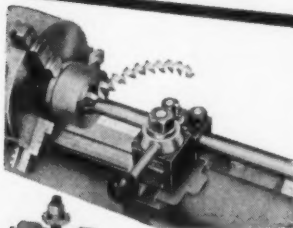
November, 1958

BUZZER
REG. U. S. PAT. OFF.**INDUSTRIAL****GAS****EQUIPMENT****BURNERS & FURNACES (Heat Treating, Melting, Soldering)****NO BLOWER OR OTHER POWER NEEDED***... just connect to gas supply!*

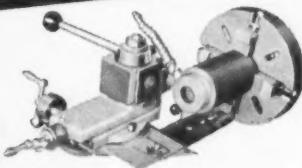
Outstanding service since 1911! Each unit, with the famous "BUZZER" Venturi, delivers the hottest, quickest heat attainable without a blower. Full range control of heat and turn-down. Standards or specials available for manufactured, natural or liquefied gas applications.

**Bench Type Oven Furnaces****Atmospheric Pot Furnaces**

Write for New
"BUZZER" Catalog.

**CHARLES A. HONES, INC.****141 S. Grand Avenue, Baldwin, L. I., New York • BALDWIN 3-1110****For more data circle 446 on Postpaid Card****YOUR LATHES "TURN OUT" BIGGER PROFITS**

WITH
ALORIS
QUICK CHANGE
**TOOL POSTS &
TOOL HOLDERS**



Change tools instantly—for turning, facing, drilling, boring, threading, knurling, cutting off or any operation.

- Maximum Repetitive Accuracy Assured
- No Shims . . . No Time Wasted
- Unlimited Versatility
- Saves 90% Set-up Time, 50% Production Time
- Greater Rigidity
- Leading Lathe Mfrs. Recommend It
- Sizes to Fit Every Lathe
- Unconditionally Guaranteed

NEW!

Aloris Holder for Carbide Triangular Inserts.
Greater rigidity, versatility, efficiency & economy



**Write For Catalog
& Price List**

ALORIS TOOL CO., INC.**419 Getty Avenue
Clifton, New Jersey****For more data circle 447 on Postpaid Card****November, 1958****modern machine shop 195**

new shop equipment . . .

for use in inspection departments, toolrooms, gage laboratories, dial indicator repair departments and so on. For more data circle 86 on Postpaid Card

★ modern machine shop ★

MICROMETERS

Polyplan Co., 45 West 81st St., New York 24, N. Y., has announced the



Polyplan Micrometer is shown here in use

availability of micrometers, which have a reading of 1/10,000th inch and measure from 0-1, 0-2 and 0-3 inches. All have six interchangeable anvils


for all purpose application. All of the anvils can be rotated a full 360 degrees on a plane parallel to the measuring surfaces, thus making it possible to measure distances between points on different axes. Because of the easy maneuverability of these anvils and their high degree of accuracy, the distinct advantages in terms of labor and production can be readily appreciated.

For more data circle 87 on Postpaid Card

★ mms ★

ACTUATOR-INDICATOR EXTENSION

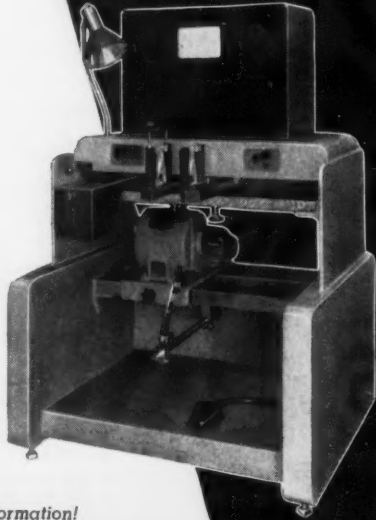
The S-P Manufacturing Corp., Solon, Ohio, has available an actuator - indicator rod extension for Model RC



BALANCING MACHINES

- Automatic Indications
- Single Knob Control
- Superior Accuracy
- Dependable Quality
- 14 Dynamic and Static Models

Write for detailed information!



BALANCE ENGINEERING COMPANY

5026 West Lake Street • Chicago 44, Illinois
Telephone: COLUMbus 1-5035

For more data circle 448 on Postpaid Card

196 modern machine shop

November, 1958

MODULAR MACHINING

with small way-type machine units —
drilling, tapping, boring, etc.

9

up to 2 H.P.
up to 6" strokes
#2 M.T.
spindles
with &
without
draw bar



GOTHA, INC.

Box 430A
Harvey, Illinois

For more data circle 449 on Postpaid Card

"SEALFLEX" TUBING



**Leakproof—
Stays in place**
For Coolants, Cutting
Oils, Solvents

Made of steel with brass
fittings — males, nozzles,
stopcocks, etc., made in
 $\frac{1}{8}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ "
I.D. Write for bulletin and
prices.

VERMONT FLEXIBLE TUBING CO.

Lyndonville, Vermont

For more data circle 450 on Postpaid Card

COLD EXTRUSION HOBBING!

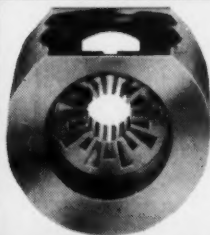
*Here At
Last!*

Intricate Shaped
Cavities are
Produced by
Cold Extrusion to
Precision Accu-
racy . . .

Cavities that
would be totally
impractical to machine are now produced
in a single operation and in any quantity.

Technique applied to copper, aluminum and
hobbing steel.

Lower cost—closer tolerances.



Send drawings of your designs for quotation to:

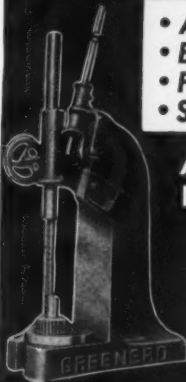
ANTON MACHINE WORKS

1226 FLUSHING AVE., BROOKLYN 37, N. Y.

For more data circle 451 on Postpaid Card
November, 1958

Greenerd PRESSES ARBOR & HYDRAULIC

- ASSEMBLING
- BROACHING
- FORMING
- STRAIGHTENING



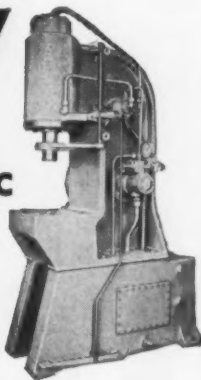
ARBOR
Presses
 $\frac{1}{4}$
to
20
TONS



For 75 years, GREENERD has exclusively
manufactured presses for production
Assembling, Broaching, Forming, Straight-
ening, etc., sold by Machine Tool Deal-
ers and Mill Supply Houses.

GREENERD Presses may be furnished
to J.I.C. standards.

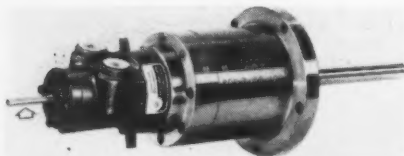
HYDRAULIC
Presses
2
to
75
TONS



Greenerd ARBOR PRESS CO.

For more data circle 452 on Postpaid Card
modern machine shop 197

new shop equipment . . .



S-P Model RC Rotating Cylinder equipped with actuator-indicator rod extension

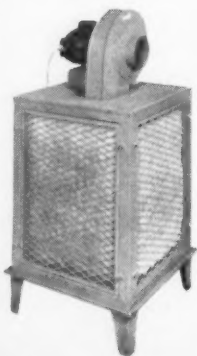
rotating cylinders. Suitable for use on automatic boring heads, automated lathes, screw machines, reels and similar machines, or in any application where lateral movement must be imparted to a rotating unit, the RC cylinder with this actuator-indicator rod can operate any control device requiring normal actuating force.

Standard rod diameter is $\frac{1}{4}$ inch with optional plain or threaded end. Rod and piston travel are identical

TORIT Mist Collectors CONTROL wet machining MIST

Wet machining operations produce floating fog and mist that could pollute the air in your plant. With the new Torit Mist Collector your men can breathe clean air and work in a safe, dry plant—while your maintenance costs go down! The new Torit Mist Collector filters out moisture through its spun glass filters—saves coolant that can be piped back into your cooling system. For full facts write today to . . . TORIT MANUFACTURING CO.

*Walnut & Exchange Sts.
St. Paul 2, Minn. • Dept. 712*



THE NEW TORIT MIST COLLECTOR

For more data circle 453 on Postpaid Card

198 modern machine shop

and rod lengths are furnished to meet individual customer requirements. RC cylinders are offered in standard bore sizes of 3, $4\frac{1}{2}$, 6 and 8 inches with 1, $1\frac{1}{2}$ and 2 inch strokes. Other combinations of bore size and stroke length are available upon special order. Working pressures up to 500 p.s.i. are permissible at temperatures up to 150 degrees.

For more data circle 88 on Postpaid Card

★ m m s ★

FAST SPIRAL TWIST DRILLS

Union Twist Drill Co., Athol, Mass., has added a series of high speed, fast spiral, twist drills to its line.

These long series drills have

November, 1958

SURFACE PLATES

- Layout Plates
- Angle Plates
- Straight Edges
- Parallels

Lawley Surface Plates are made of hand-lapped black granite from 4" x 6" x 1" to 8' x 20'. Accuracies to .00005".

awley

Write for folder

GRANITE SURFACE PLATE CO.

2000 WYOMING AVENUE
WYOMING, PENNSYLVANIA

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DRILL and PILOT BUSHINGS Frictionless —Rotary

For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch.

Write for details.

GATCO ROTARY BUSHING CO.

42330 Ann Arbor Road, Plymouth, Michigan

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make hardness tests
ANYWHERE

WITH THE

**NEWAGE
TESTER**

- CLAMPS, JAWS & BASE PLATE ARE ELIMINATED
- NO CONVERSIONS OR CALCULATIONS
- TEST ANY SIZE, SHAPE OR TYPE METAL
- NO SKILL REQUIRED
- SCALE READINGS IN ROCKWELL & BRINELL
- ACCURACY GUARANTEED

Many thousands used by industry and government.
Write, wire or call for additional details and prices.

NEWAGE INDUSTRIES, INC.

222 York Road
TURNER 4-8194

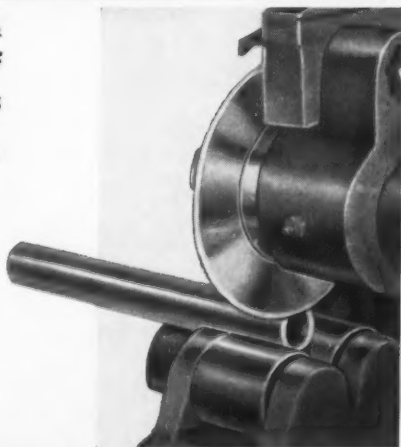
Jenkintown, Pennsylvania
Dept. MMS

For more data circle 456 on Postpaid Card

Continental Pipe & Tube Cut-Off Wheels

HI-ALLOY for LOW COST CUTS

More cuts between sharpenings—made of Shok-Resisto steel. For Continental and other rotary cut-off machines. Send for CUT-OFF WHEEL CHART . . . shows correct cutting bevels.



Continental

SINCE 1919

machine co.

WRITE FOR
CATALOG

2345 W. NELSON ST.

CHICAGO 18, ILL.

For more data circle 457 on Postpaid Card

new shop equipment . . .



Union High Speed Fast Spiral Twist Drill

been especially designed for use through long bushings or where extra length is required. The drills are also

recommended for drilling deep holes in materials of low tensile strength, such as aluminum, magnesium, copper and die cast materials.

The fast spiral and wide polished flutes on these drills are claimed to provide for better chip removal and to reduce the number of times necessary to pull the drill out in order to clear the chips. These drills are available in a size range of 1/16 through 1/2 inch,

No. 1 through 60 and A through Z.

For more data circle 89 on Postpaid Card

Direct scale reading to .0001" . . . 0" to 3" range . . . accurate to .000025"!



New!

**BAUSCH & LOMB
DR-25
OPTICAL GAGE**

FAST, EASY AS A-B-C!

A Just set part to be measured on anvil . . . no masters or set gages needed.

B Turn knob to lower spindle . . . it will stop automatically on contact, with constant spindle pressure.

C See precise measurements at a glance . . . direct-reading scale is illuminated, magnified. No eye-strain, conversion or guesswork.

ONLY \$695 COMPLETE

JUST MAIL THE COUPON!



Distributed in U.S.A. through the DoALL Co. **ON-THE-JOB DEMONSTRATION!**

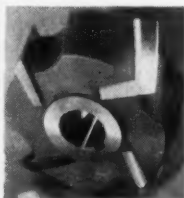
Write today for ☐ Catalog D-285, ☐ on-the-job demonstration. Bausch & Lomb Optical Co. 89335 St. Paul St., Rochester 2, New York.

Name
Company Title
Address
City Zone State

★ m m s ★

MICRO-FINISH MILLING CUTTER

An advancement in the art of milling aluminum and magnesium has been accomplished with the development of micro-finish milling cutters, designed, tested and manufactured by The O.K. Tool Co., Inc., Milford, N. H. This type of milling cutter was developed for the milling of aluminum



O.K. Milling Cutter

For more data circle 458 on Postpaid Card

and magnesium to tenths, holding a 30 micro-inch finish or better and should eliminate many grinding and hand finishing operations on aircraft and missile parts. In the ballistic missile field, superiority has become qualitative instead of quantitative; with this in mind, the new development program is working to help in this vast, but precise, program.

Known by the name of Microcut, this type of milling cutter has highly finished cutting edges and polished flutes. Cutters are available in the inserted, wedge type and solid type, including high speed steel, cast alloys and carbide.

For more data circle 90 on Postpaid Card

★ m m s ★

POPPET VALVE

Hause Machines, Inc., Montpelier, Ohio, has announced its V8B-2 Poppet, which is a high quality bleed off valve, incorporating a stainless steel body, a neoprene O ring seal and a chrome plated pushbutton head.

The valve was primarily designed for use as a pneumatic control circuit component, but it is claimed to work



Hause Poppet Valve has stainless body equally well on most applications where bleed control is required.

DUSTKOP
STOPS DUST

DUST COLLECTORS

PLUS . . .
ACCESSORIES
OR
FITTINGS

A COMPLETE SYSTEM FROM ONE SOURCE

Agat offers more! Over 38 standard Dustkop models to choose from . . . Plus engineering service to help you select, provide, and install the proper accessories and fittings to complete your dust collecting system. Write for illustrated folder . . . Today!

AGAT MANUFACTURING COMPANY

1398 E. CHURCH STREET • ADRIAN, MICHIGAN

For more data circle 459 on Postpaid Card

new shop equipment . . .

The poppet operates on gas pressures from 0 to 150 p.s.i. and has an effective orifice area of a 3/32 inch diameter orifice. The pushbutton head is properly shaped and supported for operation from axial, angular or perpendicular forces.

For more data circle 91 on Postpaid Card

**ADJUSTABLE DETAIL CHASE
FOR NAMEPLATE MARKING**

Numberall Stamp and Tool Co., Huguenot Park, Staten Island 12, N. Y., has announced an adjustable detail chase, which is not bound to be a fixed line or panel arrangement and which can be used for stamping of plates which have quite different lines or panel arrangements.

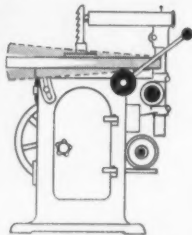
It is made with one large opening and gives the operator freedom to make his own line setups. Shims of various thicknesses and lengths are available which help to arrive at the proper setup.

The old chase with permanently fixed recesses to hold the type pieces is good for only one type of plate. Any differences in line distances or positioning of panels on different plates formerly required a second or possibly a third special chase. The manufacturer states that the Numberall



WITH DAVIS KEYSEATERS!

You can cut accurate, low-cost internal keyways at *minimum* cost with Davis Keyseaters. Here's why: (1) operation is designed for production *speed*; (2) machine sets up easily, does *not* require skilled operator; (3) maximum concentricity of the keyway in each bore assured; (4) Built in 2 sizes. Keyways range from $\frac{1}{16}$ " to 1". High speed steel cutters stocked in all sizes; (5) the *best* keyseater of its type, yet *inexpensive*! Write now for FREE DETAILED LITERATURE!



Tilting table sets easily for tapered keyways up to 3" per foot.

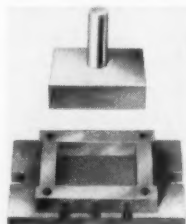


DAVIS KEYSEATER COMPANY

DIVISION OF *Hansford* MANUFACTURING CORPORATION

1239H University Ave., Rochester 7, New York

For more data circle 460 on Postpaid Card



Numberall Adjustable Detail Chase

- **PIERCING PUNCHES**
- **BUTTON DIES**
- **STANDARDS · SPECIALS**

Also send Blue Prints for Estimates on
screw machine products and
centerless grinding.

PEMCO PERFORATORS CO.

DIVISION

PORTER MACHINE CO.

CINCINNATI 9 OHIO

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TRUE POINT DRILL SHARPENER

for Drills 41 - 60 and
61 - 80 R.H. & L.H.

A properly sharpened drill cuts
faster — more accurately and is
less likely to break.

Write for circular and
full details.

UP-TO-DATE TOOL CO.

P. O. Box 99, Station A, Worcester 8, Mass.

For more data circle 462 on Postpaid Card

PALMGREN Machine Vises and Rotary Tables

There are 64 different models
and types of Palmgren
vises, rotary tables, mill-
ing attachments and
other machine tool ac-
cessories — the most
complete line of vises
and tables available
anywhere.



No. 84
8"

TILTING, INDEXING
and ROTARY TABLE \$139.50



No. 60B 6"
SWIVEL MACHINE VISE \$99.00

Used in all industries — everywhere.

Get this **FREE**
Catalog NOW



No. 2B 4"
HEAVY DUTY
ANGLE VISE
\$149.95



CHICAGO TOOL AND ENGINEERING CO.
8399 S. Chicago Ave., Chicago 17, Ill.

For more data circle 463 on Postpaid Card

HIGH SPEED

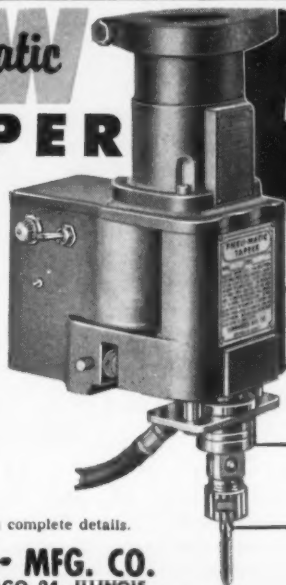
NEW *pneu-matic* **TAPPER**

The Commander PNEUMATIC
Tapper is a ruggedly built, high
speed automatic or semi-automatic
tapping unit with air feed and
Adjustable Torque Control. Spin-
dle approach and automatic con-
trol of forward and reverse tap
rotation may be set up and inter-
locked in tapping cycles and
speeds to meet any specific job
condition. Adjustable depth con-
trol assures precise repetitive
tapping depth. Precision spindle
drive permits accurate tapping,
even on older drill presses. Hand-
les taps from #0 to 3/4"-16.

The Commander Full Line Catalog has complete details.
Write for it today.

Commander MFG. CO.
4224 W. KINZIE STREET • CHICAGO 24, ILLINOIS

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Makes Any
Drill Press a
High Speed
Tapping
Unit!

Built-In
Air Feed

Fits Any
Drill Press

Precise Depth
Control

Adjustable
Torque Control

Uses Shop
Air Pressure

new shop equipment . . .

Model 20 Adjustable Chase saves the cost of these additional chases.

Steel type to set up the needed information to be marked on the plates is available in character sizes from 1/32 to 1/2 inch.

For more data circle 92 on Postpaid Card

AIR SYSTEM FOR LAPPING MACHINE

Abrading Systems Co., Speedlap Division, 8020 North Monticello Ave., Skokie, Ill., has announced a manually operated air system for its Speedlap 18 Machine. This is offered as an optional feature. The machine, together with the air system, can readily lap such materials as carbide, ceramics, including high alumina and

barium titanate ceramics, semiconductors, hardened steel, aluminum and virtually any other common material. Parts are ready for lapping as sintered, cast, stamped or turned.

The high productivity of this smaller machine now makes speed-lapping available to the smaller shop. The machine is ideally suited for aircraft

Gillen DOWEL Stock PINS

- Accurately Hardened
- Tolerances plus or minus .0001
- 2 Types-Boxed
- High Grade Steel
- Rust Resistant Coating

Standard
Size
BLUE LABEL
for New
Precision Work

Oversize
Diameters
RED LABEL
for Re-Doweling
Enlarged Holes

**STOCKED MANY LENGTHS &
WRITE FOR STOCK SIZE &**

**DIAMETERS
PRICE LIST**

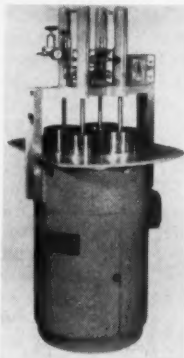
JOHN GILLEN COMPANY

Keying and Pinning Devices

2364 South 50th Avenue • Cicero 30, Illinois

A Subsidiary of Standard Railway Equipment Manufacturing Company

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Speedlap 18 Machine

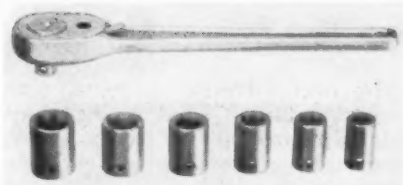
and missile parts, electronic components, instrument parts, as well as valve and seal faces.

For more data circle 93 on Postpaid Card

★ modern machine shop ★

RATCHET HANDLE AND SOCKET SET

Lowell Wrench Co., Dept. M-85, Worcester 8, Mass., has announced



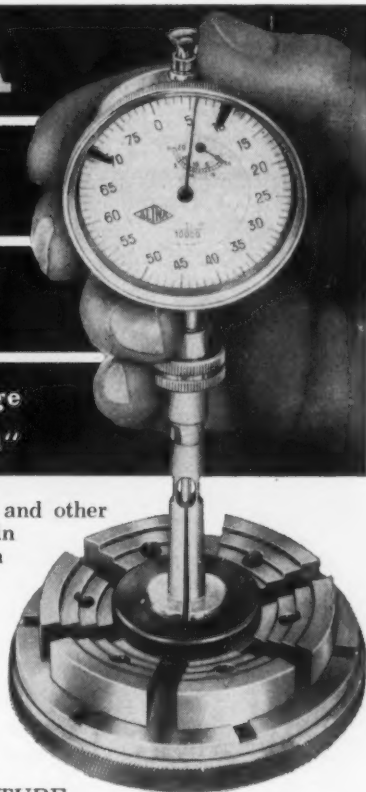
Lowell Ratchet Handle and Socket Set

that a high value analysis rating has been designed into its $\frac{1}{2}$ inch square

ALINA BORE TEST

High Precision Small Bore Gage
Dial Graduated to Read .0001"

Indicates taper, bell mouth, out-of-round and other dimensional variations of bores ranging in size from .057" thru .810". ■ Simple design and rugged construction are combined to provide a reliable instrument that will always repeat. ■ 3 sets cover complete range; each set fully equipped with rings and measuring heads. ■ 2 different holders are available for production applications.



WRITE FOR LITERATURE

ALINA CORPORATION

122 East Second St., Mineola, L. I., N. Y.

For more data circle 466 on Postpaid Card

new shop equipment . . .

drive ratchet handle and socket sets, featuring the 10 point socket styles. Manufactured to the same quality standards as the huge 6 foot long wrenches, these babies will answer the machine tool builder's and mechanic's need for rugged, dependable and efficient tools. The interchangeable sockets are available in the conventional 12 point sizes, as well as the

combination or 10 point sizes. Sockets Set SV10-6 includes six ½ inch square drive 10 point sockets, fitting 12 nut sizes (six hex and six square), together with a 10 inch long reversible ratchet handle.

For more data circle 94 on Postpaid Card

★ modern machine shop ★

RECIRCULATING OVEN

Blue M Electric Co., 138th and Chatham Sts., Blue Island, Ill., has announced large capacity, higher temperature range recirculating ovens, ideally suited for preheating, stress relieving, forming techniques and heat treating of alloys such as magnesium, aluminum, titanium or other newer alloys.

These Temp-O-Loy Ovens incorporate the company's Proportioning Control System. Construction includes



Make your
next connection
with
asg
UNIVERSAL
JOINTS

They are made to provide smooth, more efficient transmission of power and are available from stock in 13 sizes with bored or solid hubs ranging from .375" to 4.000". Special bores, bores with keyways or setscrews are available upon special order.

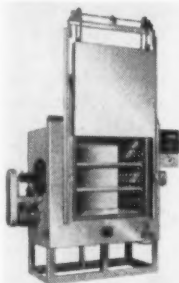
Joints with hub diameters of .750" and larger have a self-closing snap ball oiler while the small pin is held in place with a self-locking snap ring.

Send today for Bulletin No. 527 describing the full line of ASG Universal Joints available from your nearest distributor.

AMERICAN STOCK GEAR DIVISION
PERFECTION GEAR COMPANY, HARVEY, ILL., U.S.A.

For more data circle 467 on Postpaid Card

modern machine shop



Blue M Temp-O-Loy
Recirculating Oven

CAMS

MADE TO YOUR SPECIFICATIONS

—Except Screw Machine Cams—

Design Assistance Offered

KIDDE PRECISION TOOL CORP.

13 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 468 on Postpaid Card



TAP BUSHINGS

Drives all standard taps from No. 0 to 1 1/2" and pipe taps from 1/8" to 1". Five o.d. sizes.

LESS TAP BREAKAGE

LESS TAP WEAR

Write for Bulletin

BYCO INDUSTRIES

2200 SNELLING AVE., MINNEAPOLIS, MINN.

For more data circle 469 on Postpaid Card

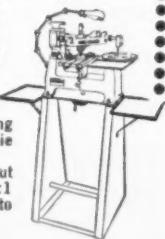
how to get . . .

faithful

3-dimensional reproduction

in steel, other metals and plastics

Use the LOW COST precision-built Preis Panto 3D-5 Engraving Machine. Does both 2 and 3 dimensional engraving effortlessly.



- Reversible spindle for enlarging or reducing from a model, die or sample
- Precision ball bearings thru-out
- Reduction ratio range: 1.6:1 to 7:1
- Four spindle speeds—7,000 to 18,000 RPM
- Micrometer adjustment collar
- Provided complete with floor stand and work tables

TRADE MARK



Write for complete details and prices. For immediate attention write directly to manufacturer below. Ask for nearest representative.

H. P. PREIS ENGRAVING MACHINE CO.

657 U.S. Route 22,

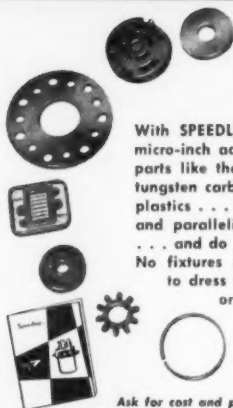
Hillside, N. J.

For more data circle 470 on Postpaid Card

save on cost!

DO THESE JOBS EASIER and FASTER with

SPEEDLAP



With SPEEDLAP'S rapid stock removal and micro-inch accuracy you can size and finish parts like these minutes faster . . . handle tungsten carbides, ceramics, tough alloys or plastics . . . obtain a 1 RMS finish; flatness and parallelism to 2 millionths of an inch . . . and do it cheaper with unskilled labor. No fixtures are required. There is nothing to dress or resharpen. No cutters or wheels to change.

Ask for cost and production estimates based on samples of your work. No obligation. (Job lapping service available if desired.)

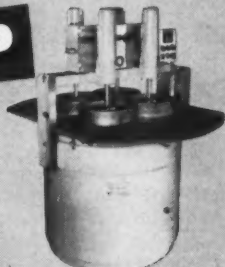
Ask For Your Copy

ABRADING SYSTEMS COMPANY

8020 NORTH MONTICELLO AVENUE • SKOKIE, ILLINOIS

For more data circle 471 on Postpaid Card

DO THESE JOBS EASIER and FASTER with



Water cooled lap base dissipates operational heat to avoid distortion.

Non-chargeable alloy lap plate assures rapid stock removal.

Pull wear control maintains constant lap flatness.

Adjustable parts-handling stage loads and unloads parts quickly.

Pull pressure air system maintains maximum lapping pressure and raises pressure plates at end of lapping cycle.

new shop equipment . . .

Eterna elements; counterbalanced door with chain, sprocket and ball bearing lift; alloy steel interior plus radiant heat shields; and heavy steel exterior.

The units are available in two temperature ranges: 150 to 538 degrees C. (302 to 1,000 degrees F.) and 150 to 704 degrees C. (302 to 1,300 degrees Fahrenheit).

For more data circle 95 on Postpaid Card

AIR PRESS FOR SIZING AND FINISHING INTERNAL DIAMETERS

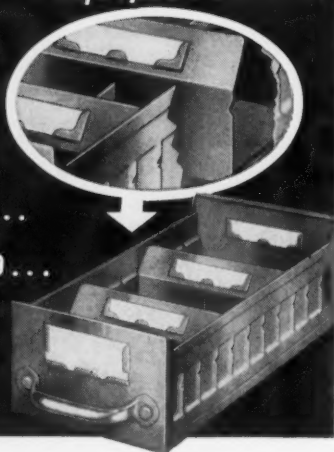
A lightweight, bench type air press, designed for sizing and finishing internal diameters, is available from Industrial Tectonics, Inc., 3686 Jackson Rd., Ann Arbor, Mich. This press comes complete with air strainer and oiler with a swivel type quick change coupler, ready for air line hook up. It is also equipped with a universal

workholding fixture and a visible track with a single ball return action powered by air jet. Two hand style safety valves actuate the downward stroke of the machine's punch, which releases the ball (previously held in the starting position of the ball return track) that, in turn, is forced through the hole which is in the part.

Another Exclusive Equipto Feature!

Drawer Dividers

lock in place...
can't creep up...
yet may be
moved easily



Equipto drawers are of one piece construction — front, bottom, back, with all welded sides. Embossed runners on bottom allow drawer to slide easily. Adjustable dividers lock in place — an exclusive feature found only in Equipto Drawer Units. Tops of dividers are slanted back and have new type instantly visible label holders . . .

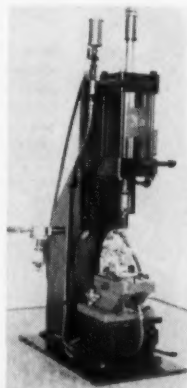
Equipto Drawer Units are available in all sizes and combinations to suit your individual storage needs. Interested? Why not find out more by writing for complete Drawer manual No. 206.

Equipto

606 Prairie Avenue
Aurora, Illinois

Manufacturer of World's Finest

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GRAYMILLS Mist Coolant Systems



"The Best in Mist"

Precise air and fluid controls, corrosion proof. Translucent containers let you see the liquid level. Write for new folder.

GRAYMILLS CORP.

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CHICAGO 13, ILLINOIS

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CAMS

Complete Facilities For

**CAM MILLING and
CAM GRINDING**

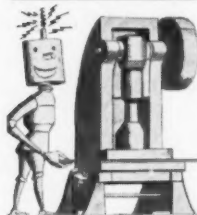
To Your Specifications

**COLUMBIA
CAM CO.**

24-07 JACKSON AVE.

LONG ISLAND CITY, N. Y.

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automatic

STOCK FEED STOP
cut your labor bill!



**DAHLSTROM
AUTOSTOP**
for punch press dies

Every stroke is a production stroke when your press is equipped with the amazingly simple Dahlstrom Autostop! It's been tested and proven in years of actual use. Adjustable to work with blanking, progressive or compound dies. Mounts on stripper plate in 15 minutes—handles sheet steel up to 1/2" x 6" or equivalent weight. Lots of 12 or more, \$1.50 each. State whether for compound or progressive dies.

Write for complete line bulletin describing Autostop, Tap Guides and Tap Chucks.

\$1.75 each

- ★ SPEEDS PRODUCTION
- ★ CUTS WASTE
- ★ INCREASES PROFITS

BRANCH MFG. CO. 15 Olsen Drive, North Branch, Minn.

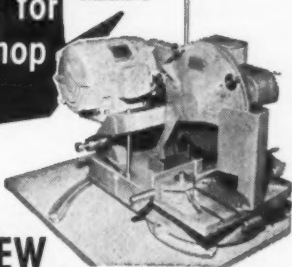
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November, 1958

LOW COST

priced so
low you
can afford
several for
your shop

**SUPERIOR
PERFORMANCE**
Gives You More Features,
Does More Work Than
Any Other
Comparable
Machine



The NEW
**BACKUS ABRASIVE
WHEEL CUT OFF SAW**
For Ferrous Metals

HERE'S WHAT THIS SENSATIONAL

MACHINE CAN DO IN YOUR SHOP . . .

- Cuts 1 1/8" bars, 2" tubing, 1 1/2" pipe, 2" x 2" x 1/4" angles
- Protects for overload and low voltage
- Has Quick action vise
- PLUS special engineered leverage for maximum sensitive "feel"
- Eliminates costly breakdowns
- Prevents high maintenance

Converts Easily For Cutting of Non-Ferrous Materials Also!

This abrasive saw is already machined to accommodate the Backus Multi-Purpose Saw Unit. With this conversion unit, the saw may be used for cutting both ferrous and non-ferrous metals!

Also Available . . . Backus Non-Ferrous Cut Off Saw

For Aluminum and Aluminum Extrusions, Plastics, Brass, Slats and Roll-Up Awnings

BACKUS

machine works SINCE 1914

ROUTE 17 CARLSTADT, NEW JERSEY

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modern machine shop 209

new shop equipment . . .

A variety of part diameters, sizes and shapes can be sized with this machine and hand tools are not required to change setups from one part to another. Parts are hand fed and up to 1,200 pieces per hour can be ballized with this equipment.

For more data circle 96 on Postpaid Card

GRAVITY CLARIFICATION UNIT FOR REMOVAL OF CHIPS AND PARTICLES

A gravity clarification unit, recently announced by Commercial Filters Corp., Department MM, Melrose 76, Mass., is claimed to provide continuous, direct flow, controlled fluid velocity for the removal of metallic chips and abrasive particles. Removal of the particles and chips is achieved by carefully controlled flow velocity, permitting minimum turbulence and maximum time for gravity action.

Retention time for proper settling is seven to nine minutes. Filtering media is not used in this unit. All particle removal is contingent upon gravity action.

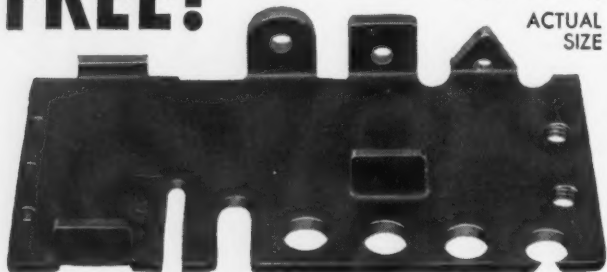
Flow capacities range from 20 to 1,000 gallons per minute, with tank capacities from 140 gallons to 7,600 gallons.

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FREE!

(SAE 1010-3/32" CRS—
SHEET STOCK)

ACTUAL
SIZE



Short-Run Design Suggestion Sample

ENGINEERS responsible for the design function will welcome this practical short-run stamping sample which *visibly* shows various common conditions that occur in metal fabrication.

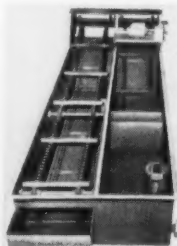
An actual production sample, it indicates typical mechanical problems met with in terms of type of material, temper and thickness.

**REQUEST SAMPLE AND BULLETIN DSS-2 ON
YOUR LETTERHEAD**

DAYTON ROGERS
Manufacturing Company

MINNEAPOLIS 7D, MINNESOTA

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**Delpark Gravity
Clarification Unit**

**CUT
TOOL
COSTS**

broken tools
made like new again
with **NU-TANGS**

Twisted or broken tangs replaced at low costs on any tool with a Morse Taper (sizes 1 to 6). Hundreds of leading industries save money on drills, reamers, countersinks, cutters, drivers, the NU-TANG way. Prompt delivery. Send for prices—or send tools for repair. All work guaranteed.

**NO WELDING! NO SLEEVES!
NO SHORTENING! NO DISTORTION!**

Send them to
us like this!

**GUARANTEED
STRONG AS NEW!**

We return them
like this!

Patent No. 2,920,881 **NU-TANGS** INC. 1339 Bates Avenue Cincinnati 25, Ohio

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The Leading Machine
Tool Manufacturers
use

**RUTHMAN
GUSHER
COOLANT PUMPS**

Model **THE RUTHMAN MACHINE CO.**
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LINLEY JIG BORERS

Give You Maximum
Utility—at Low Cost

The improved Linley Jig Borers are more efficient than ever. Accurate and fast in operation—easy to set up. Made for the exacting requirements of small part precision work. Using Linley Jig Borers allows larger capacity borers to be used where intended, on heavier jobs. Once you've installed a Linley, you'll wonder how you got along without it in your shop.

Table Size: 7" x 17½"
Table Travel: 6½" x 10"

Send for complete details.



LINLEY BROTHERS CO.

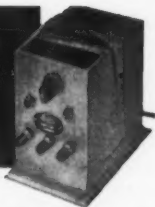
JIG BORERS—RIVET SPINNERS

661 State St. Ext., Bridgeport 1, Conn.

For more data circle 480 on Postpaid Card

November, 1958

THE
Luma
WAY

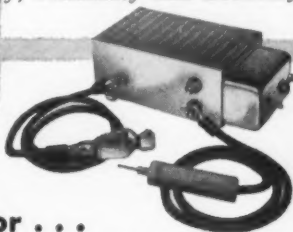


for . . .
PRODUCTION SOLDERING

Handles numerous soldering jobs from fine precision to medium-heavy industrial. More than 16 styles of electrode holders to fit individual soft or hard soldering operations.

From 6 to 30 stages of heat with a selector switch used in conjunction with 3 secondary terminals.

A wide range of power—5 to 2500 watts—quickly supplies concentrated heat at exact area—insures perfectly soldered joints with maximum Speed, Safety, Flexibility and Economy.



for . . .
ETCHING & DEMAGNETIZING

Marks the hardest steel, stainless steel, steel alloys or carbides with the ease and legibility of a pencil. 4 types of interchangeable marking points available to serve every purpose. 6 to 36 distinct marking heats. Easy to operate. Two tools in one. Demagnetizes over a 4 to 8-inch width. Especially valuable when tools have been in contact with magnetic chuck.

Write for New Catalog descriptive of all modern Solder Tools, Etch-tools, Demagnetizers . . . today.



**THE LUMA
ELECTRIC
EQUIPMENT CO.**

P.O. Box 132-MS • Toledo, Ohio
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modern machine shop 211

new shop equipment . . .

TRIOULAR MICROSCOPE

Bausch and Lomb Optical Co., 893 St. Paul St., Rochester 2, N. Y., has announced production of a line of Dynoptic Microscopes equipped with triocular bodies. In addition to the visual comfort provided by inclined binocular eyepieces, the triocular microscope combines a monocular tube for

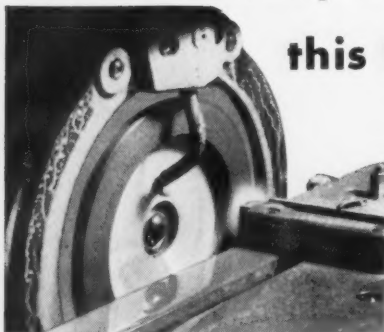
camera attachment, which allows convenient photomicrography or simultaneous visual observation by a second person. The design of the instrument allows 80 percent of the source illumination to be directed to the monocular camera tube. High intensity B and L microscope illuminators are said to assure that remaining light will be sufficient for visual operation.

Observation at binocular eyepieces is continuous and uninterrupted, even

during photographic exposure, and can be made at a comfortable light intensity, without filters, from low power scanning through high power oil immersion.

The triocular body doubles normal magnification. It can be rotated over full 360 degrees for accurate orientation of the specimen in relation

NOW...Better by actual test...



**this NEW
A.I.T.
"E-2"
Diamond
Wheel for...**

ELECTROLYTIC GRINDING

The exclusive "E-2" bond in A.I.T. diamond wheels has been developed specifically to guarantee that you get the **FULL VALUE** out of Electrolytic grinding of carbides. We can prove this in **YOUR** plant, on **YOUR** grinders, with these results:

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6. Specially designed wheel to reduce weight and distribute electrolyte efficiently

Remember, to get these **FULL VALUE** results, be sure to send for complete test data today.

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Triocular Microscope**

JIG BORING to your specification

At your disposal: Our sub-contract jig boring department, one of the best equipped in the East.

A. K. TOOL CO., INC.

ROUTE 22, MOUNTAIN SIDE, N. J.

Telephone: ADams 2-7300

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USE-EM-UP TYPE



STANDARD TYPES

SLEEVES AND SOCKETS

AND A

complete line of COLLETS

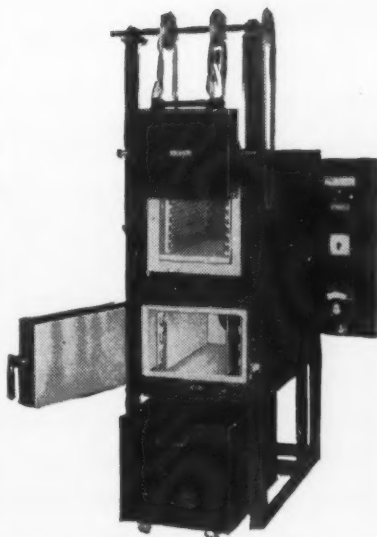
• COLLIS Taper Tools are made by men skilled in this type of manufacture. Users get long satisfactory service from COLLIS Equipment and find the answer to all drilling, reaming, and tapping needs in the COLLIS line. We can give prompt service on orders for Lathe Centers, Arbors, Drill Drifts, and Magic Type Chucks as well as on Sleeves and Sockets and Collis.

THE COLLIS CO.

DEPT. A, CLINTON, IOWA

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November, 1958



SAVE SPACE WITH A SERIES 8055 COMBINATION MODEL

The Series 8055 is two electric heat treating furnaces (Hardening 2,000° F. and 2,300° F., and Drawing 800° F. and 1,250° F.) in the floor space of one furnace. Each furnace is independently controlled permitting hardening and drawing operations to be performed at the same time. All models are delivered with separate controls for each furnace. The 8055 series is made in nine standard sizes... other models are made to your specifications. Furnaces operate on standard line voltage... no transformer necessary. A hardening and pre-heating combination is also available.

Write for a free catalog of the entire Lucifer line. Engineering advice is offered without obligation. Write, wire or call...

LUCIFER FURNACES, INC.

NESHAMINY 6, PA.

Phone Diamond 3-0411

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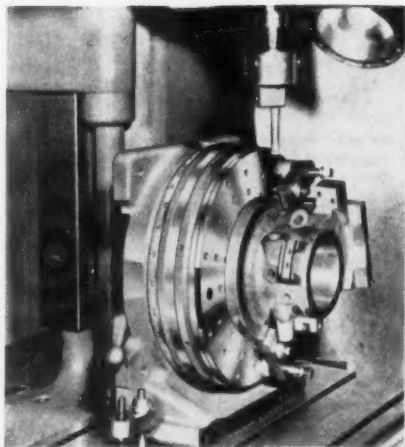
to the picture frame and quickly locked for comfortable viewing position. For more data circle 98 on Postpaid Card

★ modern machine shop ★

DIVIDING HEAD

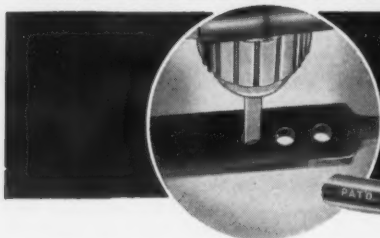
AA Gage Company has developed a new measuring principle which is claimed to place laboratory accuracy on the production line. This development may do for arc measurement what the gage block now does for linear measuring.

Embodied in a newly developed dividing head, the principle breaks down the arc accurately to within fractions of a second. It does this consistently and repeatedly, not after



The unusual versatility of this AA Gage Indexing head is indicated in the above close-up view, which shows the unit in vertical position to accurately locate holes for precision jig boring an aircraft casting.

DRILL HARDENED STEELS WITHOUT ANNEALING —



Use the New
IMPROVED
"HARDSTEEL"
DRILL

With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon - high chrome steels of any degree of hardness. "HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly. Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" Drills are cutting costs in thousands of plants.

BLACK DRILL COMPANY, INC.

1372 East 222nd Street • Cleveland 17, Ohio



YOU HARDEN IT —
WE'LL DRILL IT WITH —

"HARDSTEEL"

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"Jorgensen"
REG. U.S. PAT. OFF.

and "Pony"

CLAMPS

ASK YOUR SUPPLIER.

send for free catalog.

the clamp folks

ADJUSTABLE CLAMP CO.
436 N. Ashland, Chicago 22, Ill.

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MINIATURE DRILL BUSHINGS

Hole Sizes—No. 80 to 3/32"

O.D. 3/32" to 13/64"

Lengths 1/4" to 3"

.0002 Tolerance on I.D.

O.D., and Concentricity

Specials to your specifications

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PREBCO BUSHING CO.

14702 East Arrow Hwy., Baldwin Park, Cal.

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RIVETERS...

GRANT

PIONEERS
and
PACEMAKERS
in their
line



—head rivets from smallest to 3/4" diameter cold steel, either by NOISELESS SPINNING or VIBRATING HAMMER method — fast, economically — types include Vertical and Horizontal Spindles, foot-power or automatic.

Free estimates of your work.

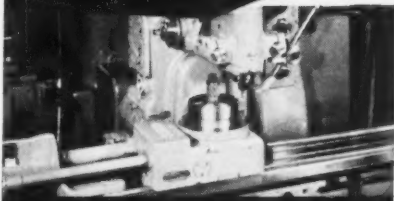
Write for catalog today.

THE GRANT MFG. & MACHINE CO.
96 Stillman Ave. Bridgeport 8, Conn.

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November, 1958

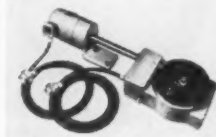
How To Increase Production And Improve Accuracy



With a SUNDSTRAND Automatic Index Base

In many cases, the addition of this Automatic Index Base has increased milling production enough to eliminate need for the purchase of additional machinery. It may be the answer to your milling production requirements. Call in a Sundstrand engineer. There is no obligation for this service.

Accurate
Spacing,
Powerful
Clamping
Insures
Accuracy



Sundstrand
Automatic Index Base

This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

Get Complete Data Free

This 8 page booklet contains production figures and specifications. Send for your copy today. Ask for bulletin 597.



SUNDSTRAND MACHINE TOOL CO.

2539 Eleventh Street, Rockford, Ill., U.S.A.

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lengthy mathematical calculations, but in less than a minute.

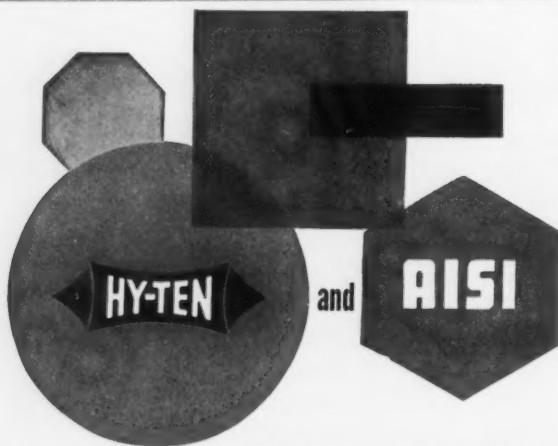
According to Michigan Tool Co., 7171 East McNichols Rd., Detroit 12, Mich., who is the sales outlet for this dividing head, this head has been checked out on an interferometer and is claimed to obtain its fractional accuracies through a concept that

consists of hundreds of angular plane mating surfaces, making contact at each one of the 360 degree settings with an equal number of accurate mating surfaces. Thus, each time the head is indexed, accuracy is assured, not by one or two mating surfaces, but by hundreds.

Although the dividing head is a valuable laboratory tool for quality control operations, it is particularly adaptable in production inspection for

boring operations, jig grinding, hole layouts and in locating slots and serrations. It is said to be so accurate that it can be used to scribe graduation lines in the right places and indicate the proper spacing between them in the manufacture of various types of highly precision optical instruments.

This development consists of a base, two plates that are serrated and a cam, in all about six simple elements. The heart of the indexing head is a pair of ground serrated master plates. Each plate has 360 serrations that seat into each other in order to provide for positive positioning and locking. A simple cam arrangement separates the two



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All seven of our warehouses are staffed and supplied to fill your alloy steel requirements promptly whether you need standard AISI, SAE or our own special HY-TEN steels—"the standard steels of tomorrow".

Write today for Wheelock, Lovejoy Data Sheets containing complete information on grades, applications, physical properties, tests, heat treating, etc.

NEAR YOU . . . Warehouse Service — Cambridge • Cleveland
Chicago • Hillside, N. J. • Detroit • Buffalo • Cincinnati
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WHEELOCK, LOVEJOY & COMPANY, INC.

40 Sidney Street, Cambridge 39, Mass.

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**Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS**

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from $\frac{3}{16}$ " to $\frac{3}{4}$ " U.S.S. Inexpensive — Last for years.



Write for Circular
**NIELSEN TOOL &
DIE COMPANY**

17360 Lahser Road, room 202
Detroit 19, Michigan

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JIG BORING

and

Large Precision Machining

Done to your specifications

We have 22 Jig Borers

KIDDE PRECISION TOOL CORP.

15 LOCUST AVENUE, ROSELAND, N. J.

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**STANDARD
WOODRUFF KEYS**



We manufacture a complete line of Woodruff keys in all standard sizes. These sizes range from as small as $\frac{1}{2}$ " x $\frac{1}{16}$ " to keys as large as $3\frac{1}{2}$ " x $\frac{3}{4}$ ". All keys are carefully checked for burrs, slivers, etc., before being shipped to you. Only the finished tested keys are permitted to leave our plants.

We carry a complete stock of high quality, dependable keys. Send for our catalog for complete information on Woodruff keys, taper pins, machine keys, and machine racks.

STANDARD STEEL SPECIALTY CO.
BEAVER FALLS • PENNSYLVANIA
Plants: Beaver Falls, Pa.; Hammond, Ind.

For more data circle 494 on Postpaid Card

November, 1958

**"We Are Extremely
Well Pleased With
TRICO-MIST"**

(Name on request)

This production manager writes: "We had difficulties with a drilling operation on aluminum. After installing a TRICO-MIST, we were able to increase production at a lower cost of operation and turned out a better finished product. We are extremely well pleased with the TRICO-MIST Coolant System."



Yes, For As Little As \$22.00

you, too, can increase production, obtain finer finishes and accuracy on all your drilling, tapping, milling, sawing, grinding and other operations.

Get Complete Details

SEND FOR BUL. NO. 37

TRICO FUSE MFG. CO.
MILWAUKEE, WIS.

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modern machine shop 217

new shop equipment . . .

plates when indexing. In operation, the top plates is disengaged from the lower plate by the cam. When raised, the top section can be rotated 360 degrees. When set at the degree desired, the upper plate is simply lowered on the bottom plate and locked in. The serrations are so accurate that when the upper plate is lowered, the serrations

automatically locate the exact degree sought.

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**LIGHTWEIGHT BENCH SHEAR
CUTS FLATS AND ROUNDS**

A lightweight bench shear, that will cut flats, angle iron, rounds and bar stock without changing dies or cutting

blades, is now available from the Whitney Metal Tool Co., 720 Forbes St., Rockford, Ill. Mild steel capacities are $\frac{1}{8}$ inch angle iron, 10 gauge flat stock, $\frac{7}{16}$ inch round bar cut-off and $\frac{3}{16}$ by 2 inch flat bar stock.

Roller bearings at hinge points ease the shearing operation of this No. 39 Bench Shear. The frame has been formed from $\frac{1}{2}$ inch plate. The unit is $7\frac{3}{8}$ inches tall, 10 inches long and 4 inches wide with a handle length of 30 inches. The entire unit, including the handle, weighs only 18 pounds. Both bench mounting brackets and adjustable work holddown are furnished.

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CHICAGO[®]
DREIS & KRUMP

PRESSES
STRAIGHT-SIDE TYPE

with large die area
capacities up to
400 tons

AND
GAP
TYPE
PRESSES

6779

Complete recommendations for any job on request



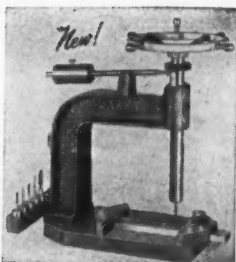
Press Brakes • Straight-Side-Type Presses • Press Brake Dies

Hand and Power Bending Brakes • Special Metal-Forming Machines

**DREIS & KRUMP
MANUFACTURING CO.**

7418 South Loomis Boulevard, Chicago 36, Illinois

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LASSY

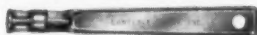
Supersensitive Hand Tapper

New exclusive features and top quality make Lassy Tappers outstandingly the finest available.

Write for New Illustrated catalog on Time Saving Devices.

LASSY TOOL COMPANY, Plainville, Conn.
For more data circle 497 on Postpaid Card

Buy safe "SHUR-GRIP"



drop forged HANDLES

Designed to hold 3 to 6 lb. lead hammer heads more firmly — will not slip — keeps hammer head in shape longer — makes remodeling easier, quicker, surer, less expensive.

Write for circular and prices

LAWRENCE H. COOK, INC.

67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.

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PRECISION
MADE

BEMISINE

**ANGLES TO A MINUTE . . .
IN A MINUTE**



(Sales Territories Open)

**DRILLING — MILLING — JIG BORING
GRINDING — INSPECTION**

Write for Bulletin

Mutual Machine Co., Hudson, Mass.

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SPECIFY TOP QUALITY



ARBOR SPACERS

SHIMS and SPACING COLLARS • Arbor

Spacers and Shims in 20 sizes and thicknesses from .001" to .125". Arbor Spacers furnished with standard keyway; Shims, with no keyway. Also Spacing Collars in numerous popular diameters, and in thicknesses from 1/4" to 3". Hardened and ground; edges chamfered. Furnished with standard keyway.

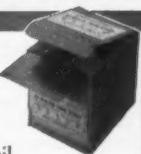


FEELER STOCK •

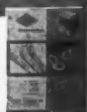
Made from tempered stock, rolled to close tolerances, 1/2" x 25' coils packaged in transparent plastic boxes, except above .020". Strips 1/4" x 12", in cellophane. 27 thicknesses. All thicknesses from .001" to .032". (For use in precision fitting, checking clearances, inspection and production work.)

SHIM STOCK •

Steel or brass. Selected from material rolled to precision limits, free from burrs, and protected by oil coating. Coils packed in carton for easy dispensing and protection. 15 thicknesses, .001" to .032". Sheets 6" x 12"; coils 6" x 120". Available also in two assortment packages—12 thicknesses, .001" to .015", and 15 thicknesses, .001" to .032".



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Illustrated Brochure
and Price List



DETROIT STAMPING CO.

349 MIDLAND AVE., DETROIT 3, MICHIGAN

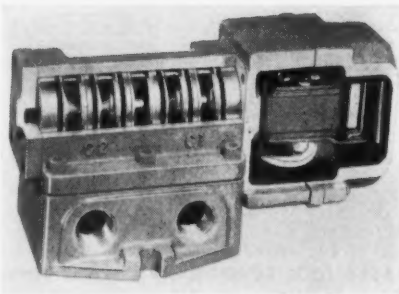
For more data circle 500 on Postpaid Card

new shop equipment . . .

AIR CONTROL VALVES

Air Valves Co., 22729 Hoover Road, Warren, Mich., has introduced a complete line of four way air control valves. Single and double solenoid operated models and single or double pilot (air) operated master valves are available in $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$ inch pipe sizes. This line features the company's "Controlled Expansion Seal," which is claimed to provide positive sealing in all operating ranges, from 28 inches vacuum to 150 p.s.i.g., and is characterized by its unusually low breakout friction. These A.V.C.O. Valves utilize a balanced, direct operated spool which, with the "Controlled Expansion Seals," allow the use of small, low amperage solenoids for the direct operating force.

For more data circle 101 on Postpaid Card



A.V.C.O. Four Way Air Control Valve

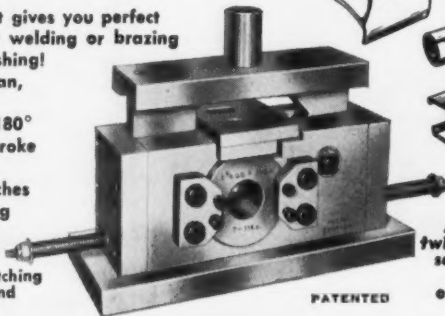
CLAMP AND JACK SET

Allied Machine and Engineering Corp., 12890 Berea Rd., Cleveland 11, Ohio, has developed a handy clamp and jack set, which has been designed for use on planers, boring mills, radial drill presses, milling machines and most other machine tools. It is available in A, B and C sets for light,

the **ARC-TWIN** *Cuts Two Perfect Notches* in One Downstroke of Press!

SAVING both time and cost, it gives you perfect T-joints — instantly ready for welding or brazing! Twin-acting punch shears clean, from inside out, leaving two matching notches (in perfect 180° alignment) with every downstroke of the punch press. Quickly interchangeable dies and punches accommodate pipe and tubing from $\frac{1}{2}$ " to 2 $\frac{1}{2}$ " O.D.; special units, up to 3" O.D.

Special Arc-Twins for double notching stainless steel or monel metal and units built to your specifications can also be furnished.



Ask for
twin-notched
sample of
pipe
or tubing

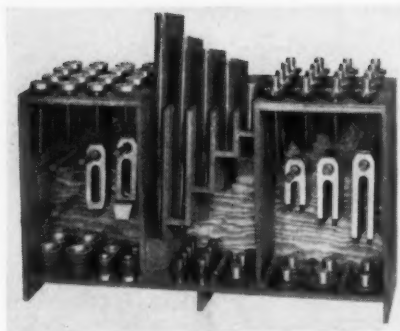
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VOGEL

TOOL AND DIE CORPORATION

1823 North 32nd Avenue
Melrose Park, Illinois

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Allied Clamp and Jack Set speeds setups

medium and heavy work. Each set comes in a handy storage cabinet. The B set height range is 0 to 65 inches. All of the sets have swivel screw adjustment at the top in order to maintain vertical or horizontal right angle support with the work

surface. Leveling jacks are a part of the B and C sets.

For more data circle 102 on Postpaid Card

★ modern machine shop ★

THREAD RING GAGE RECONDITIONING KIT

A thread ring gage reconditioning kit, designed for the salvaging of worn thread ring gages, has been introduced by Alameda Gage Co., 10851 Capital Ave., Oak Park 37, Michigan.

This lapping kit, which consists of a Go and NoGo thread lap and 600 grit lapping compound, is to be used in reconditioning worn thread ring gages which still have useful life, but will not set properly on the setting plug because of taper or bellmouth from wear on the first threads. The use of this kit will correct this condition and restore the minor diameter



IMPROVED TYPE HOLDERS for stamping into Metal, etc.

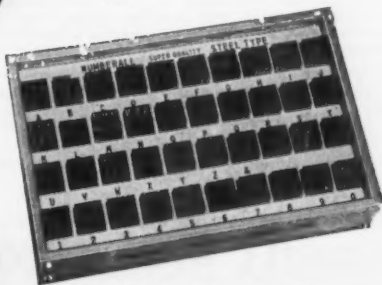


STEEL
TYPE

TYPE AND TYPE BOX

Indexed Sectional Type Box with separate compartment for each character. Two sizes for small and large type.

Hand or Press Style. Type can be easily, quickly loaded and unloaded. Simplest construction... just a sturdy pin holds the type securely. No screws nor springs. Super-quality steel type made in various sizes: $\frac{1}{32}$ " up to $\frac{1}{2}$ " figures and letters. Write for Bulletin MS23H.

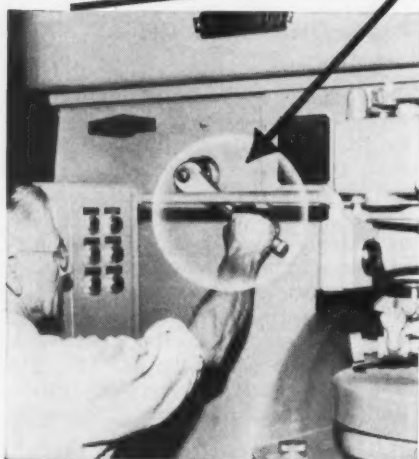


NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

Type Box Bulletin on request.

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Fast and Safe in hard-to-reach spots



This **LOWELL** Reversible Ratchet Wrench

- speeds setup time
- keeps hands from moving parts

An exclusive and popular feature of the *Series 20 Lowell Gear Wrench* is the reversing knob at the end of the handle.

Machine tool builders find it especially useful for working in dangerous or inconvenient parts of the machine where the hands can't safely reach. And its great strength—the crushing action is on the pawls, not on a pin or screw—makes it a dependable wrench on *any* job.

In the photo above, a *Series 20* wrench is shown as original equipment on the Norton Hyprolap lapping machine. Besides its important functional use, this Lowell Wrench is favored for its neat and modern appearance.

Gear sizes range from $\frac{1}{4}$ " to $2\frac{3}{4}$ ", square or hex, and handles from 7" to 36" in length.

Write for Illustrated Details

LOWELL WRENCH CO.

Dept. M-75

Worcester 8, Mass.

For more data circle 503 on Postpaid Card

222 modern machine shop

new shop equipment . . .



Alameda Thread Ring Gage Reconditioning Kit

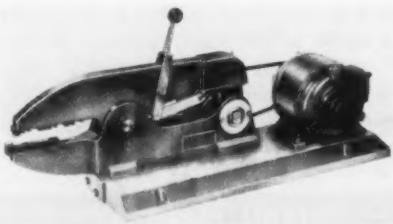
of the ring to the correct relation with the pitch diameter. Of particular interest to users of thread ring gages for the checking of plated parts, is the ability to remove minor nicks or scratches and clear the ring of foreign matter, which may have become wedged in the root of the threads.

For more data circle 103 on Postpaid Card

★ modern machine shop ★

UNIVERSAL NIBBLER

Amplex Engineering Co., Inc., New-castle, Ind., has announced a universal nibbler, which has been designed and built to fill all requirements of



Amplex Rapid Universal Nibbling Unit

November, 1958

CAMS

Fully equipped modern machine shop with extensive Jig Boring, Surface Grinding, Horizontal Boring and Thread Grinding facilities as well as modern Cam Milling and Cam Grinding equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC

23-16 44th Road Long Island City 1, N. Y.

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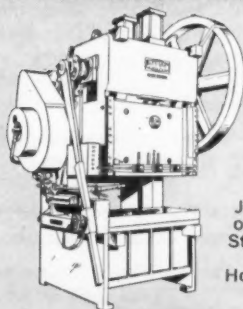
**PACE TAPER ROLLER BEARING
LIVE CENTERS
ACCURACY
 $\pm .0001''$ TIR
RIGIDITY**

Preloaded with two Precision Matched Timken or Bower Taper Roller Bearings for . . . GRINDING • PRECISION TURNING HEAVY-DUTY OPERATIONS

Write to:

PACE ENGINEERING COMPANY
1507-B E. Michigan St., Indianapolis, Ind.

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GAP

Write today for BULLETIN 1958

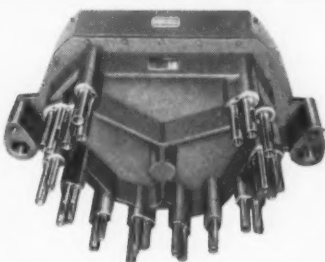
Complete "specs" on Johnson line of Inclined, Straight Side, Gap and Horn Presses.

Johnson
POWER PRESSES

JOHNSON MACHINE & PRESS CORP.
620 W. INDIANA AVE., ELKHART, INDIANA

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November, 1958



**This
THRIFTMASTER
Fixed Center
DRILLHEAD—
does 27 jobs
in 1 fast operation!**

Get maximum production—use Thriftmaster designed and built Fixed Center Drillheads . . .

- Full ball bearing construction
- Fully hardened chrome-moly steel gears, spindles and drives
- All sizes, any number of spindles
- All types, including angular, rotating and lead screw
- For drilling, tapping, reaming, boring and milling
- Guaranteed performance backed by over 25 years of engineering and production experience

Also Full Ball Bearing Universal Joint, Single and Double Eccentric Adjustable Drillheads and Dorman Tappers.

Write, wire or phone for complete information today.



1034 N. PLUM STREET • LANCASTER, PENNSYLVANIA
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modern machine shop 223

new shop equipment . . .

the sheet metal industry and which can be used either as a stationary or portable machine. It has variable speed and stroke adjustment and features changeable dies for various operations such as grooving, flanging, cutting circles and shapes. It is shipped with four sets of dies, pulleys, belt, motor base, extension arm, circle cutting attachment and straightedge. The unit has a capacity up to 9/64 inch in mild steel.

For more data circle 104 on Postpaid Card



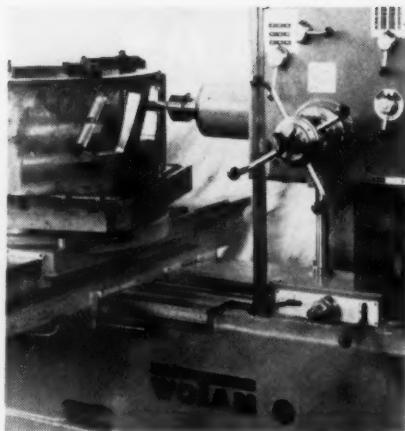
Used by U. S. Armed Forces

**MACHINE TOOL
RECONDITIONING**

and the Art of Hand Scraping (3rd printing). Send for free folder describing illustrated book.

MACHINE TOOL PUBLICATIONS
324 Wabasha, 215 Commerce Bldg.
St. Paul 1, Minn.

For more data circle 508 on Postpaid Card



Shown above is the Wotan Boring Mill

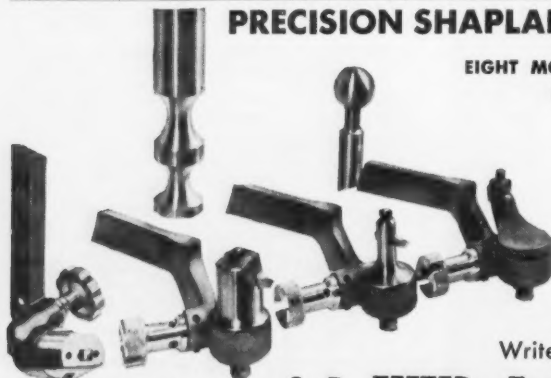
AUTOMATIC PRECISION MILLING OF FRAMES, HELICAL SURFACES AND SLOTS

Index Industrial Corporation, 150-MM Broadway, New York 38, New York, recently announced that completely automatic cutting of frame and helical surfaces and slots is now possible on the Wotan Boring Mill, 3- $\frac{3}{8}$, 4- $\frac{3}{8}$ and 5- $\frac{1}{8}$ table type.

PRECISION SHAPPLANE RADIUS TOOLS

**EIGHT MODELS FOR LATHES, SHAPERS,
PLANERS AND BORING MILLS**

Range: $\frac{3}{8}$ " to 3" for concave radii on lathes. Two sizes for convex radii (Balls up to 2 $\frac{1}{2}$ " dia.) on lathes. Also heavy duty model for radii to 6" on planers, etc.



Patent Pending

Write for circular

C. B. TEETER - Tool Room Specialties

1221 W. Addison St., Chicago 13, Illinois • Phone DRexel 3-3571

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REDUCE Set-up Time and the need for expensive jigs & fixtures

HART MILLING FIXTURES

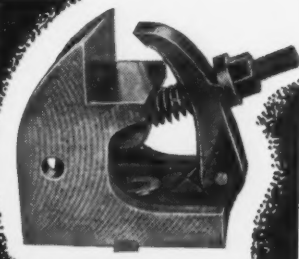
"Masters of A Thousand Set-ups"

Write for illustrated Folder

Value proved by years of use.

WALTER W. FIELD & SON, INC.

39 Hayward St., Cambridge 42, Mass.



For more data circle 510 on Postpaid Card



DYKEM STEEL BLUE

Stops Losses

making Dies and Templates

Popular package 8-oz. can fitted with Bakelite cap holding soft-brist brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead
THE DYKEM COMPANY
2301F North 11th St. • St. Louis 6, Mo.

With DYKEM Steel Blue Without DYKEM Steel Blue

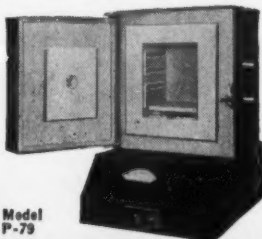
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PRODUCED AND PRICED RIGHT FOR YOUR ELECTRIC FURNACE NEEDS

DYNA-TROL

MODEL NO.	FIRING CHAMBER (H.W.D.)	PRICE (300° to 2000°)	PRICE (400° to 2300°)
P46	4½"x4½"x8"	\$90.00	\$110.00
P79	6"x6"x9"	\$205.00	\$225.00
P918	9"x9"x18"	\$480.00	\$528.00
P414	14"x14"x14"	\$525.00	\$603.25
P124	12"x12"x24"	\$715.00	\$822.25
P818	18"x18"x18"	\$775.00	\$887.50
P136	18"x18"x36"	\$1125.00	\$1312.50

Automatic Controls Available on all Models

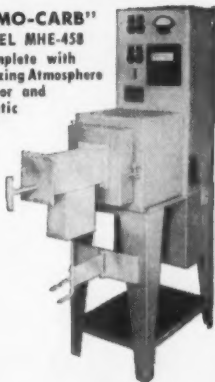


Model P-79

- Infinite zone temperature control
- Zone temperature indication by Pyrometer Selector Switch
- Automatic hold and cut-off instrument available
- Patented element holders
- Infinite variety of time-temperature curves obtainable
- Rugged construction

"ATMO-CARB" MODEL MHE-458

Complete with Carburizing Atmosphere Generator and Automatic Control



\$1325.00

Other Sizes and Arrangements Available



MANUFACTURING CO.
Chester 71, Pa.

For more data circle 512 on Postpaid Card

new shop equipment . . .

The vertical power feed to the spindle operates simultaneously with the power operated rotary table. The lead of the helix is determined by the constant ratio between vertical and table rotation.

With spindle speeds from 9 to 1,000 or 14 to 1,600 and 27 feeds from 0.001 to 0.500, a selective range from coupling power table rotation and vertical power feed to the head provides for controlled precision milling of helical grooves and slots.

For more data circle 105 on Postpaid Card

★ modern machine shop ★

MIST COLLECTOR

Torit Manufacturing Co., Dept. 703, 311 Walnut St., St. Paul 2, Minn., has

introduced a line of mist collectors which collect mist and fog from all wet machining operations. The Torit Mist Collectors use no high voltage electronic equipment and they combine simple, foolproof, economical design with high efficiency performance.

Three separate models have been specifically designed for use in wet machining operations of automatic screw machines, tool grinders, surface grinders, centerless grinders, air foil grinders, electrolytic grinders, thread grinders and other mist producing operations.

Performance of this line of Torit Mist Collectors is guaranteed to be satisfactory whenever installations are made according to the company's recommendation.

Torit Mist Collectors collect the mist laden air at the machine and filter it by passage through highly efficient spun glass filters. These collec-



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CATALOG

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★

JIG AND FIXTURE COMPONENTS

Latch Bolts	Jig Feet (3 Types)
Cast Iron Hand Knobs	Spherical Washers
Aluminum Hand Knobs	Fixture Keys
Quarter Turn Screws	Knurled Head Screws
Shoulder Screws	Toggle Shoe Clamps & V-Pads

HOLD DOWN AND CLAMPING TOOLS

T-Nut & Stud Sets	Tee Nuts
Step Block & Clamp Sets	Coupling Nuts
Flanged Nuts	Adjustable Step Blocks
Cut Thread Studs	Strap Clamps (Plain & Step Type)

CATALOG INCLUDES TRACING TEMPLATES

Northwestern

119 HOLLIER AVE.,
DAYTON 3, OHIO



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RELIANCE

Angle Dresser \$37.50 Radius Dresser \$57.00

Shipped on 10-day Money-Back Guarantee

Angle Dresser guide block is hardened and honed, push bar is hardened and ground. Radius Dresser bearing adjustment is lifetime. Both tools are finished in black wrinx enamel. Diamond, \$7.50.

Order direct. We pay postal charges.

RELIANCE TOOL & MFG. CO.
1919 Clybourn Ave., Chicago 14, Ill.

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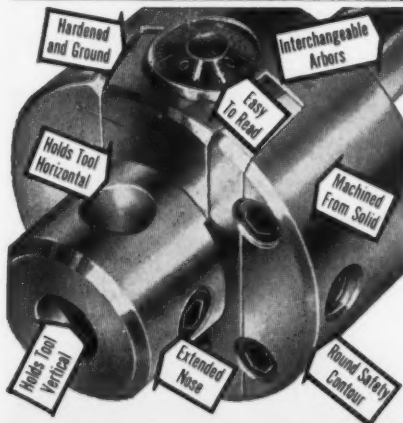
DRILL THESE HOLES BY A QUICK, EASY, INEXPENSIVE METHOD

Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS
Wilmerding, Pa.

For more data circle 515 on Postpaid Card

FLYNN BORING HEADS



**LEADING NAME IN
BORING HEADS FOR 40 YEARS**
19 MODELS Write for catalog

FLYNN MANUFACTURING CO.
133 FLOWERDALE AVE. • DETROIT 20, MICH.

For more data circle 516 on Postpaid Card

November, 1958

"DO IT YOURSELF" Saves Hours, Cuts Costs



HEAT TREAT SMALL PARTS, TOOLS, DIES, ETC. IN YOUR OWN SHOP WITH A VERSATILE, HIGHLY EFFICIENT TEMCO ELECTRIC FURNACE.

Why tie up your big equipment on small heat treat jobs below its capacity, or why "farm out" heat treating of parts, tools, dies? Put a TEMCO bench-type electric furnace in your shop and see how it pays for itself over and over again—in time-savings, cost savings, and production conveniences. Shown above is Type 1700 furnace with the Control Cabinet Assembly featuring the fully-automatic AMPLI-TROL controller in this convenient mounting.

TEMCO Furnaces are economical to own and operate . . . easy to hook up . . . easy to use Eighteen models with chamber sizes from 4" x 3 3/4" x 4 1/4" to 10" x 9 1/2" x 22". \$65 to \$1,100 complete with controls. Write for new TEMCO-THERMOLYNE catalog information and name of nearest dealer.



ELECTRIC FURNACES

Thermo Electric Manufacturing Co.
488 Huff St., Dubuque, Iowa

For more data circle 517 on Postpaid Card

modern machine shop 227

NESTING TYPE
TOTE PANS
 20" x 12" x 6 1/4"
 (16 Gauge)

J. L. LUCAS & SON, Inc.
 BRIDGEPORT 3, CONNECTICUT

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BREMIL
 The IMPROVED Compound Lever Shears

ALL ALLOY
 FULLY
 GUARANTEED



Two Sizes

PORTABLE

No. 1 cuts up to No. 11 gauge strip or sheet.
 No. 2 cuts up to 1/4" steel plate.

BREMIL MFG. CO.
 1020 Holland St., Erie, Pa.

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GISHOLT
FACTORY-REBUILT
MACHINES

NEW MACHINE GUARANTEE

phone or write for quotations
 and details

GISHOLT
 MACHINE COMPANY

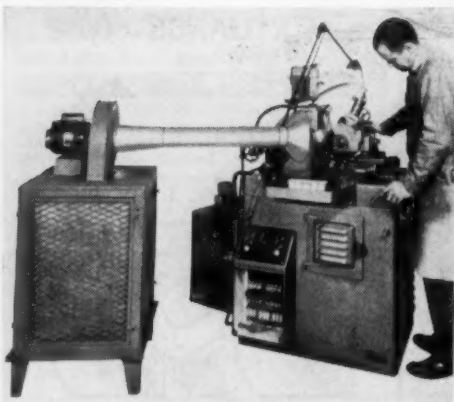
1219 E. Washington Ave., Madison 10, Wis.

Phone: Alpine 6-9081, Ext. 222

For more data circle 520 on Postpaid Card

228 modern machine shop

new shop equipment . . .



Torit Mist Collector is shown here being used in a centerless grinding operation

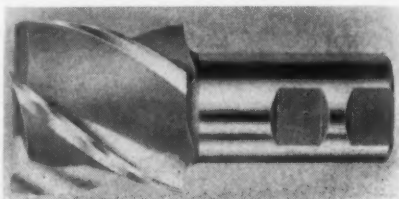
tors are compact and have been designed to stand on the floor and, where preferred, can be mounted on walls or suspended from ceilings or overhead beams.

For more data circle 106 on Postpaid Card

★ modern machine shop ★

MILLING CUTTER

Tomkins-Johnson Co., Cutting Tool Division, 617 North Mechanic St., Jackson, Mich., has introduced its "E" Line of Milling Cutters. These cutters have been designed to have a



Tomkins-Johnson "E" Milling Cutter

November, 1958

**DESIGNED
FOR MAXIMUM EFFICIENCY
BUILT IN 28 SIZES**

HUPPERT

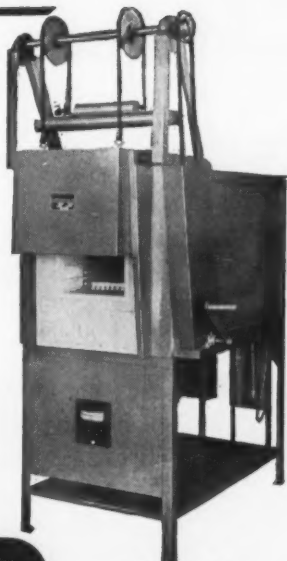
Floor Model FURNACES

- Continuous operation to 1850°F.—intermittent to 1950°F.—for 2300°F. on special order.
- Complete with indicating electronic controller.
- Tight-sealing, wedge-type door.
- Standard for 220 V. AC, single or 3 phase operation — 110 V. or 440 V. on special order.
- Multi-insulation for maximum efficiency.

*Request literature on complete line of
Huppert Furnaces*

K. H. HUPPERT CO.
Manufacturers of Electric Furnaces and Ovens

6841 Cottage Grove Ave., Chicago 37, Illinois



Model No. 16
Illustrated
Inside Dimensions
12" W. x 8" H. x 18" D.
\$1050.00 complete

For more data circle 521 on Postpaid Card

B.S.A. CHUCKS MEDIUM DUTY • PRECISION MADE IN ENGLAND



MODEL 580
Self - centering
Geared Scroll
UNIVERSAL •
Three Jaws

Includes 1 set Ex-
ternal Jaws, 1 Key,
1 set Internal Jaws,
3 Pinions, 3 Bolts.

IMMEDIATE DELIVERY

SIZE	WEIGHT (lbs.)	CHUCK BORE	PRICE
3"	3½	1"	\$ 35.75
4"	8	1½"	35.75
5"	12	1¾"	41.50
6"	17½	2"	48.00
7½"	29	2½"	56.50
9"	42	3"	71.50
10½"	62	3½"	88.50
12"	88	4"	120.00
15"	143	4½"	180.00
18"	200	5"	261.00
21"	262	5½"	320.00
24"	324	6"	390.00



MODEL 550
4-JAW INDEPEND-
ENT CHUCK

Includes 4 operat-
ing screws, 4 Re-
versible Jaws, 4
Bolts, 1 Key.

SIZE	WEIGHT (lbs.)	CHUCK BORE	PRICE
4½"	8	1"	\$ 30.50
6"	16	1½"	35.00
8"	34	1¾"	51.00
10"	60	2"	62.50
12"	80	2½"	74.50
14"	98	3"	84.00
16"	126	3½"	105.00
18"	166	4"	140.00
20"	204	4½"	165.00
22"	246	5"	205.00
24"	322	5½"	220.00
30"	490	6"	340.00

Order Today

Dept. B, 251 Centre St.
NEW YORK 13, N. Y. CANAL 6-5575

VICTOR MACHINERY EXCHANGE, INC.
Dealers in Tool Room Equipment

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new shop equipment . . .

high helix angle, double back off and a right hand spiral. These features assist the user to produce more cuts between grinds by giving a free cutting tool, a smooth surface and a strong tool. Specially applicable to slab milling, die sinking and production milling, the "E" line of milling cutters is now available from stock

from 2 inches in diameter, with 2 inch long flutes, to 2¾ inches in diameter, having 6 inch long flutes. Set screw flats are standard on all shanks.

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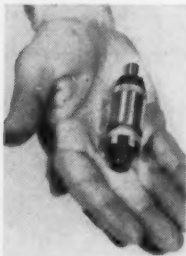
★ modern machine shop ★

MECHANICAL OVERLOAD CLUTCH

A line of Safe-Torque Mechanical Overload Clutches has been announced by Scully-Jones and Co., 1909

South Rockwell Street, Chicago 8, Ill., for use as a subassembly or for attachment to a source of power. Two standard ratings of precise torque control clutches are currently available: 0 to 84 and 48 to 120 inch-pounds. Other models have been developed up to 800 foot-pounds.

Two general types of Safe-Torque Clutches are included in this line: the



Scully-Jones Safe-Torque Mechanical Overload Clutch

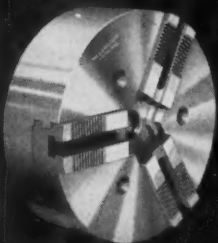
cut floor-to-floor time...

assure accuracy...

with



POWER CHUCKS and ROTATING CYLINDERS



S-P POWER CHUCKS. Self-centering or compensating. American Standard or serrated. 2 or 3 jaws. Sizes, 6 to 18 in.

Famous S-P cam and lever design

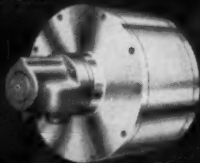
- grips work tighter, resists jaw opening under load
- longer jaw travel, balanced for high rpm.
- flame hardened master jaw ways

installed as original equipment by leading manufacturers

S-P ROTATING CYLINDERS. Sizes, 3 to 16 in. bore (air), 3 to 8 in. bore (hydraulic, 500 psi).

Air and hydraulic

- weight-saving design, long stroke, compact inlet
- balanced for high rpm, American Standard mountings, finished adapters available



Representatives in principal cities. Phone or write for Catalog No. 112.



for speed
and
performance

THE S-P MANUFACTURING CORPORATION

SOLOH, OHIO

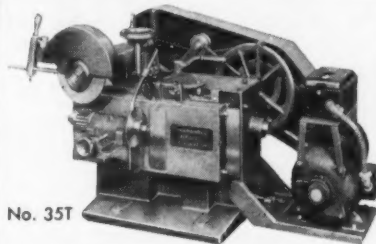


NON-ROTATING AIR AND HYDRAULIC CYLINDERS • ROTATING AIR AND HYDRAULIC CYLINDERS • POWER CHUCKS • COLLET AND DRILL PRESS CHUCKS • VALVES, ACCESSORIES

A BASSETT COMPANY • IN GREATER CLEVELAND • ESTABLISHED 1916

AA-7483

For more data circle 523 on Postpaid Card



No. 35T

SHARPENS SAWS

Automatically, In Gangs

Just think of it! 100 26 gauge saws sharpened at one time. Takes saws up to 5½" dia. and 1¾" thick. Saws are automatically indexed and sharpened within a variation of plus or minus .001 of exact diameter of entire lot.

WRITE FOR CIRCULAR 35T

The WARDWELL MFG. CO.

3803 RIDGE RD.

CLEVELAND, O.

For more data circle 524 on Postpaid Card



ARBO-2
automatic indexing
turret type multi-
spindle drill head

**JEMCO'S ARBO-2 fits any
single spindle vertical drill press**

all operations completed with one chucking — no reversing of drill spindle necessary for tapping — speeds changed quickly — reduces machining time — tapping capacity 1/8 to 9/16 — drilling capacity 0 to 1 9/32

EXCLUSIVE TERRITORIES OPEN

write for complete information to . . .



Jersey manufacturing co.

401-C LIVINGSTON ST. • ELIZABETH, N. J.

For more data circle 525 on Postpaid Card

November, 1958

What is your LUBRICATING PROBLEM?

- ☐ **LATHE CENTER LUBRICATION**
SCORING-GALLING
- ☐ **GRINDING CENTERS**
LUBRICANT WASHOUT
- ☐ **DRAWING**
SCORE MARKS-DIE WEAR
- ☐ **STEADY RESTS**
WORK PIECE DAMAGE
- ☐ **PRESS FITS**
SCORING-SEIZING
- ☐ **DIE POSTS**
WEAR-FREEZING



CMD Lube has solved many like it with excellent results. Perhaps CMD will be your answer, too!

**CHECK AND
SEND IN FOR
SAMPLE**

Anti-Scoring Lubricant
**CHICAGO MANUFACTURING
AND DISTRIBUTING CO.**

1910 West 46th Street, Chicago 9, Illinois

For more data circle 526 on Postpaid Card

modern machine shop 231

new shop equipment . . .

one shot type and the continuous over-riding type. The torque setting of the clutches can be sealed against unauthorized tampering, if desired.

These clutches may be applied wherever torque control and protection are required. Instruments, textile machinery, machine tools, hand power

tools, packaging lines and plastic machinery are some of the fields of immediate interest.

For more data circle 108 on Postpaid Card

★ modern machine shop ★

SMALL BORE GAGE

Foster Supplies Co., 6122 Milwaukee Ave., Department MMS, Chicago

46, Ill., recently announced that its complete line of Diatest high precision small bore gages now cover a range of diameters ranging from 0.820 inch to 1.130 inches.

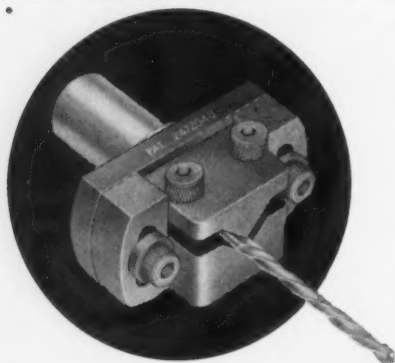
Previously, three sets (E-1, E-2 and E-3) were available for gaging sizes and discrepancies in bores of 0.057 to 0.823 inch.

Now added to the line is Set No. E-4, which covers diameters ranging from 0.820 inch to 1.130 inches.

The manufacturer claims that its Diatest bore gages are accurate to within 0.00008 inch and all sets overlap in size in order to assure complete range.

All parts are obtainable separately, if so desired.

For more data circle 109 on Postpaid Card



in half the time

Brookfield Tool Holders make tool set-ups easy!

Now, without bushings or collets, on the first try you can set up drills, counterbores, reamers or cutters for almost any machining operation. Precision ground V-jaw vises, Brookfield Tool Holders make even toughest set-ups a cinch. With one wrench, insert the tool, tighten the jaw, then float the tool into dead center position and tighten.

It's as easy as that!

FREE! Descriptive illustrated brochure, plus price and specification lists.

BROOKFIELD, INCORPORATED

STOUGHTON 111, MASSACHUSETTS

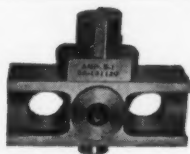
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NEW FLUSH PIN AMPLIFIER

OFFERS 5 to 1
AMPLIFICATION

- No dial indicator needed • No master required
- Extremely rugged • Speeds up inspection • .001 to .010 tolerance range. WRITE FOR DETAILS.

HOLMES GAGE & DEVELOPMENT CORP.
Columbus 3, Ohio



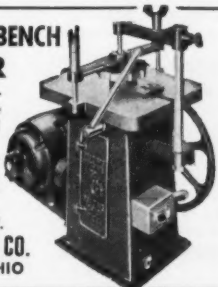
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READING BENCH KEYSEATER

Portable — move directly to job; a time saver for both small and large shops.

3 3/4" stroke; adaptable for other work. Low first cost — prompt delivery.

Good dealers wanted.
READING MACHINE CO.
CINCINNATI 37, OHIO



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with the **NEW SCHERR MICRO PROJECTOR**

with the
**VERTICAL
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**NEW
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featuring

Rigid Floor Base — eliminating
extra charge for table
Tilting Stage for Helix, Angles
and Bore
6" Dia. Stage Opening
14" Diameter Screen
Column Slides adjustable for
wear by means of gibs. Will
hold square indefinitely.
Custom made Precision Coated
Lenses and double condensers
for different objectives 10 to
100X magnification.
Surface Illuminator can be
added anytime.

An entirely new practical
designed tool for Inspection De-
partment and Production Shop.

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BASIC PRICE . . . \$450.00

**SCHERR PRECISION
COMPARATOR CHARTS**

OVERLAY and REPLACEMENT
STANDARD CHARTS
are carried in stock.

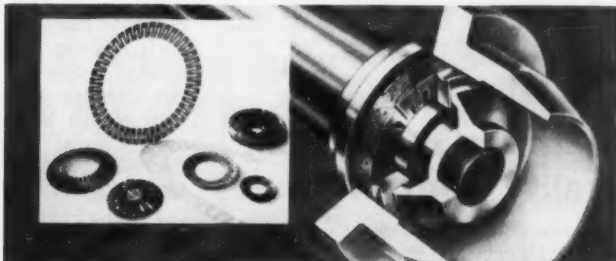
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to your specifications.

GEORGE SCHERR CO., Inc.
COMPLETE LINE OF PRECISION INSTRUMENTS

WEST COAST BRANCH: SCHERR-TRINCO CO. - 2327 W. Olympic Blvd. - Los Angeles 19, Cal.
200-MN LAFAYETTE STREET • NEW YORK 12, N. Y.

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RINGSPANN DISCS (inner photo) come in various shallow tapered designs. Inside chucking shows their position.



NOW! Cut Machining Costs!
RINGSPANN DISC holding provides the *Modern Method* for clamping workpieces. Ideal for delicate parts; no distortion.

RINGSPANN DISCS assure accurate machining by automatic, concentric holding, high clamping force, therefore greater economy and precision.

FREE! For illustrated catalog containing complete technical data, write today.

**NEISE
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New York 16, N. Y.

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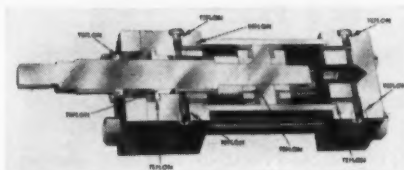
November, 1958

modern machine shop 233

new shop equipment . . .

HYDRAULIC CYLINDERS PROMOTE PLANT SAFETY

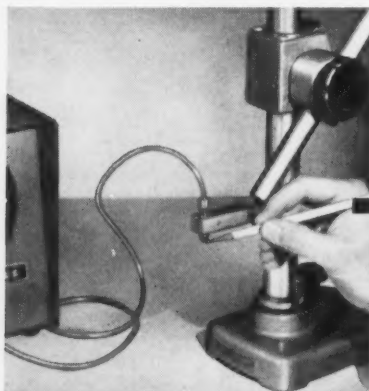
Hydraulic cylinders, for promoting plant safety and reducing insurance risks, have been announced by Flick-Reedy Corp., Miller Fluid Power Division, 2024 North Hawthorne, Melrose Park, Illinois. The "safety first" features of the cylinders include the use



Hydraulic cylinder offers safety features

of Teflon for all seals that seal against external leakage and design features

guaranteed to eliminate the fire and accident hazards of oil leakage. The Teflon seals provide two-fold protection. Teflon offers complete immunity to the destructive chemical action that non-inflammable hydraulic fluids have on many of the sealing materials used in hydraulic cylinders. Teflon has the ability to withstand high temperatures (up to 450 degrees F.). The cylinders offer other safeguards against leakage. Rod seals that seal with Teflon are guaranteed not to leak one drop of oil (barring heat, chemical or mechanical damage to the seal). Piston rods are case hardened and chrome plated to



Taft-Peirce Air Capsules measure only 1½" long overall x .375" diameter. The Plain Body Type shown above clamps easily on standard shop measuring tools, or may be built into special gaging fixtures.



The Threaded Body Air Capsule features extra fine pitch body threads for applications where the Capsule must be critically positioned or moved slightly along its axis at frequent intervals.

NEW Air Capsule Provides Low Cost Accuracy for Gaging and Quality Control

From toolroom to transfer line, this new Taft-Peirce Air Capsule creates exciting new opportunities to apply high magnification, visual gaging to all kinds of close tolerance inspection work.

Clamp the Capsule on height gage or surface gage for precise work checking on a surface plate. Substitute it for dial indicators or micrometer heads when designing gaging fixtures. Take advantage of its long-wearing carbide contact point by using it as a sensing device for continuous process inspection.

A Taft-Peirce Air Capsule operates with any CompAIRator Air Gage at any standard magnification, allowing you to spread a few thousandths of an inch over a wide dial expanse, with each graduation equal to a tenth or finer. Available in short range models (0 — .004"), and long range models (.004" — .040"), with plain or threaded bodies. Write today for more information.

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REICH — THE ONLY 3-WAY PRECISION TEST INDICATOR

Accurate and repeated reading in either direction. No mirror needed to read both sides or top. Non rust, non magnetic movement. .014" reading.

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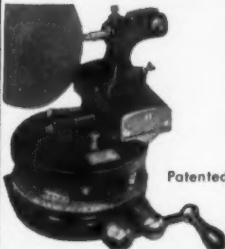


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MILLING SERVICE,
JIG BORING
... SPOT WELDING
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EXPERIMENTAL DEVELOPMENT

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734 S. 13TH ST., NEWARK 3, N. J.

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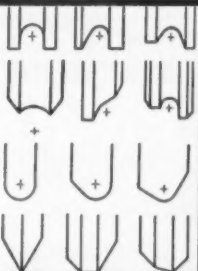
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WHY WASTE TIME?

Dress Profiles like these in a few minutes without Templates or Crusher Rolls with the Jeon Automatic Angle Tangent to Radius Dresser. It's fully universal.

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REPRESENTATIVES WANTED
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JEON MANUFACTURING CO.
P. O. BOX 6750 WASHINGTON 20, D. C.



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COMBINATION Straight, Box and Pan Bending

ROLLER BEARING BRAKES

**WHITNEY-
JENSEN**

4-5-6-8-10 FOOT LENGTHS

16-14-12 Ga. Capacities

Will accommodate inside bending, radius forming, and many other intricate operations with special attachments — as well as straight bending of all kinds, with maximum accuracy and minimum effort.

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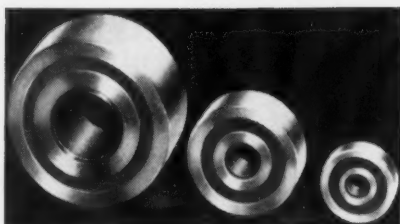
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prevent mechanical damage and are equipped with Teflon dirt wipers. For more data circle 110 on Postpaid Card

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DIAMOND HONE DRESSERS

"Tru-Hone" Diamond Hone Dressers, said to accurately true up honing

"Tru-Hone" Diamond Dressers for honing tools

stones in almost any honing tool, are being marketed by the Staple Engineering Co., 1315 South Woodward Ave., Birmingham, Mich. The thousands of small diamonds in these dressers are metal bonded and are claimed to last years in normal production use, truing new and worn honing stones.

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when Barry machinery mounts are used in machine installation or moving.

- SAVED \$54.00 per machine installation . . . American Type Founders
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236 modern machine shop

FLEXIBLE BALL TYPE MANDREL

The Pines Engineering Co., Inc., 644 Walnut, Aurora, Ill., has announced the availability of the "Free-Flex" Mandrel, a new type of flexible ball mandrel that has been designed to make top quality bends to a radius of 2-D (centerline - 2 x tube diame-

November, 1958

**PRECISION
GEARS?**



**ROLL TEST THEM RAPIDLY -
ACCURATELY with the**

SCHERR 5" CENTER DISTANCE FINE PITCH GEAR TESTER

Fine Pitch Precision Gears are quickly tested
for runout of Pitch Diameter, Spacing and
Tooth Form Errors.

Scale Vernier:
.0005" Indicator Readings

The New Model
is equipped with adjustment of
measuring pressure from
4 ounces to 4 pounds

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200-MM LAFAYETTE STREET • NEW YORK 12, N. Y.

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ETTCO-EMRICK



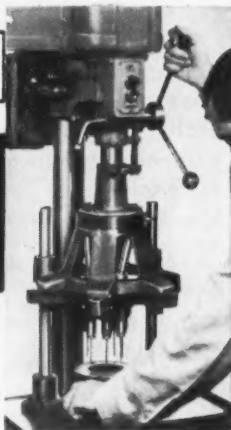
nuckle-heads

**fully adjustable for dependable
multi-hole drilling and tapping**

**5 models to choose from —
circle or straight line types**

- Chrome nickel universal ball joint type spindles.
- Adapt to any drill press or drilling or tapping unit or machine — Operate in any position.
- Quickly convertible for either drilling or tapping on any drill press.
- Lubricated ball joints with neoprene covers — an Etcco exclusive.
- Tap or drill capacities up to $\frac{3}{8}$ " in steel.
- Precision built, lightweight and compact.

Unconditionally guaranteed
for workmanship, material
and performance.



Write for complete details today . . . Buy them from your Etcco Distributor

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Etcco-Emrick

TOOL BITS

THAT SATISFY

Sparground

The Unusual Bits



Made from a special high grade alloy steel that makes them especially adaptable for machining extremely tough and very hard materials, such as heat-treated steels, die and stainless steels, etc.

These Spartan ground tool bits have greater wear resistance than any other high speed type.

KUTALL Tool Bits. These bits for economical general purpose cutting.

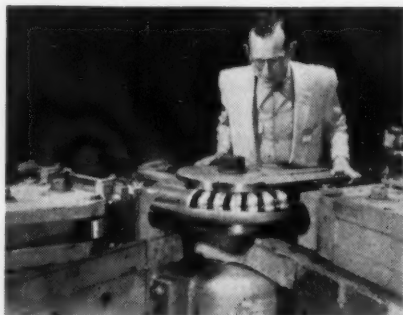
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It May Help You

SPARTAN SAW WORKS, INC.
SPRINGFIELD, MASS.

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238 modern machine shop

new shop equipment . . .



H. B. Condiff, responsible for development of "Free-Flex" Mandrel, is inspecting it on Pines Model 4 Bender. The wall of the bend in the 4½ inch stainless tube with 0.025 inch wall has been cut away to show the mandrel position at end of bend

ter) in thin wall tubes. The "Free-Flex" Mandrel uses a threaded pin with a spherical head to hold a series of balls together. The spherical head of the pin fits into a spherical seat in the ball, permitting movement in any direction.

"Free-Flex" Mandrels are available in diameters ranging from 1 to 6 inches and are constructed of steel for the bending of non-ferrous and carbon-steel tubing and Ampco-coated steel or solid Ampco for the bending of stainless steel tubes.

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★ modern machine shop ★

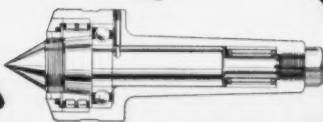
MAGNETIC 5 INCH SINE PLATE

The Bald Eagle Corp., 356 Cedar St., St. Paul 1, Minn., has announced the availability of a 5 by 3 inch sine plate with built in permanent magnetic chuck. The top surface provides ample working area and rails on the side and end make accurate locating

November, 1958

NIELSEN

Heavy Duty Live Centers



Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

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M on live centers

NIELSEN, INC. LAWTON, MICHIGAN

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free!

NEW 1958
CATALOG



92
TIME SAVERS
FOR TOOL MAKERS

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411 Morris Ave., Springfield, N. J., DRexel 6-4767
MAIL READER SERVICE CARD TODAY FOR YOUR COPY

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November, 1958

MAXWELL

Automatic RECESSING TOOLS

REDUCE INTERNAL CUTTING COSTS



These fully automatic, quickly adjustable tools save time, cut costs on precision grooving, undercutting, inaccessible spot facing, chamfering, back facing and necking.

They are used with jig or fixture on automatic or manual feed machines. Long-life circular form cutters, or tool bit holders with tool bits may be used. Location and diameter of recess are individually controlled by stop collars, adjustable to within ± 0.001 -inch. Five sizes available to pilot into 1" to 2 1/4" bushings. Furnished with shank to suit.

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BULLETIN NO. J-F

1151-MC



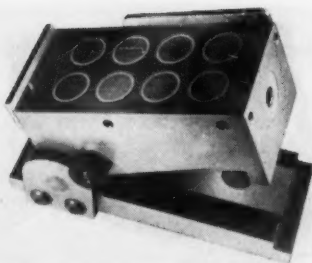
THE MAXWELL COMPANY

493 E. Fifth Ave., Ashtabula, Ohio
For more data circle 543 on Postpaid Card
modern machine shop 239

new shop equipment . . .

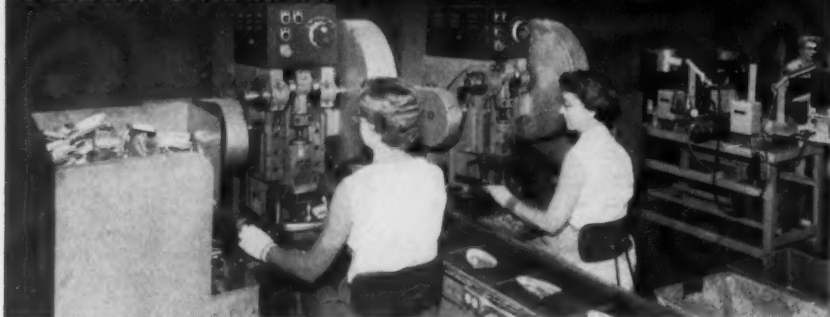
of pieces easy. The permanent magnet holds the piece securely for light machining operations. These features are said to make the tool an ideal fixture for many production machining operations and for production inspection, as well as for toolroom use.

For more data circle 113 on Postpaid Card



Bald Eagle Magnetic 5 Inch Sine Plate

Four Piece Assemblies at 600 per Hour With Kenco 15-Ton Electro-Safe Punch Presses



These two Kenco Presses each assemble four parts of electric irons at the rate of 600 components per hour at General Electric Company, Ontario, California. A third Kenco on the line assembles these components with a top plate. Parts are fed to the operators through hopper bins and assembled parts are carried away on a belt conveyor.

Kenco Electro-Safe Presses are used because of their unprecedented safety features and their ability to stay on the job — for maximum production. The press has no flywheel — in single stroke operation the press and motor go dead, eliminating double-tripping and stored-energy hazards. The operator must hold two widely spaced controls depressed to single trip the machine. A locking dial permits changing from "single trip" to "continuous trip" or "inching".

The Electro-Safe control can be connected to the die area to stop the ram on the downward stroke should any irregular feeding occur, thus protecting both the part and the die set. In addition, extra long ram guides keep perfect alignment which results in long die life, and many other exclusive features to keep them on the job.

You too can increase production with Kenco Presses — and at the same time increase profits. Can we give you additional information?

JOB FACTS:

Company: General Electric Co., Ontario, California

Machines: 3 Kenco 15-Ton Electro-Safe Punch Presses

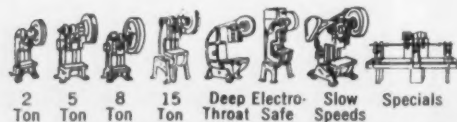
Job: Assembling 4 Parts each for electric irons

Shifts: Up to 3 for 9 months.

Maintenance: Brake relined.

Production: 600 assemblies per hour

Remarks: "The presses are extra safe" and "Dies last longer".

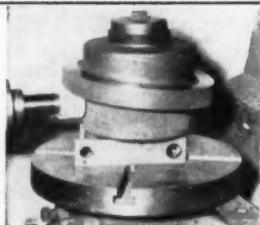


2 Ton 5 Ton 8 Ton 15 Ton Deep Electro-Throat Safe Slow Speeds Specials

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KENCO
MANUFACTURING CO.

5211 Telegraph Rd., Los Angeles 22, Calif.



Rowbottom for Cams

No problem too tricky

Cam illustrated here resulted from turning the one it replaced "inside-out" to accomplish finer adjustment of mechanism... a typical Rowbottom job. We can help you, too. Send your specifications.

THE ROWBOTTOM MACHINE CO., P.O. Box 4097, Waterbury, Conn.

Also builders of Cam Millers, Cam Grinders and Rotary Profilers

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You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool

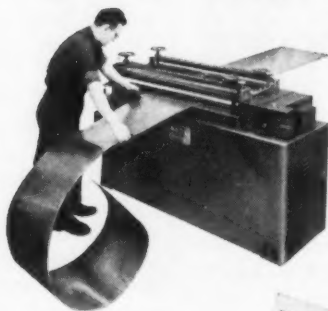
IN 11 SIZES—No. 6 to 1"
N.C. In all S.A.E. sizes.



HEIMANN MFG., CO. • URBANA, OHIO

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The best sheet metal **ROLLER LEVELER** ever built!



WOEHR ROLLER LEVELERS

(in several standard models)

flatten steel, aluminum, brass and copper in widths up to 60"

... in gauges .010 to .125! Your fabricating capacity and efficiency are increased *immediately!*

Safe, one-man operation is simple and accurate.

Send for FREE BOOKLET.
Our brochure gives complete specifications and data.
Write for your copy TODAY.



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machine co.

13 FAVOR STREET • ROCHESTER, NEW YORK

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new shop equipment . . .

DIE ELIMINATES WORK MARKING AND DIE CHANGEOVERS

A female press brake die, with roll inserts which eliminate work marking and reduce die setup and changeover time, has been introduced by O'Neil-

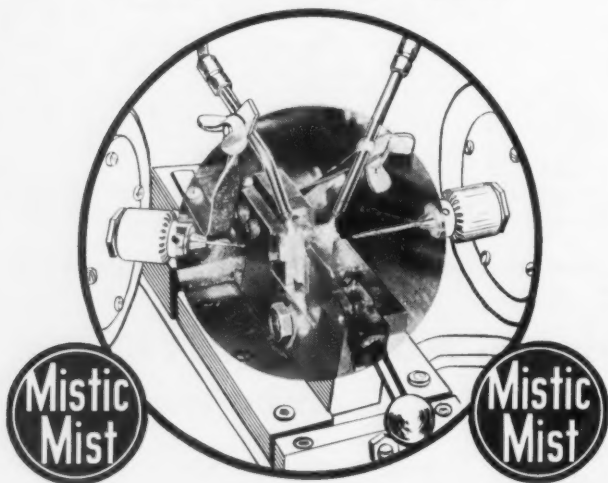
Irwin Manufacturing Co., 576 Eighth Ave., Lake City, Minn. This die can be used in any mechanical or hydraulic press brake or punch press. Called Di-Acro Rol-Form Dies, they are particularly useful where polished, painted and bright metals are being formed, as they eliminate work marking on those materials.

The dies differ from conventional vee dies in that the die block houses

two hardened and ground, half round inserts which roll up and toward the opening in the die block as the male die enters the material to be formed. It is the rolling action of these inserts that does away with work marking. After each operation, a compression spring returns the roll inserts to a flat position, ready for the next bend.

Four standard styles of the Rol-Form Dies with half round inserts, varying in size from $\frac{1}{4}$ to 1 inch, are available. The larger the half round insert, the greater the material capacity. Up to 12 foot standard lengths of the Rol-Form Die can be obtained for press brakes. Shorter sections

PROPER USE OF MIST COOLING



FOR DRILLING

Direct the mist at the point of contact of the drill and the work. For jig use, a 45° cut drill bushing and an angular hole drilled in the jig to accept the small ($\frac{3}{16}$ ") nozzle, provides "built-in" cooling efficiency . . . right where it is needed. MISTIC MIST GENERATORS assure you longer drill life, better finishes, closer tolerances and greater production output. A proven fact!

Engineering service is available to help you with your cooling problems. Call MISTIC MIST . . . "pioneers in mist cooling generators"

AETNA MFG. CO.

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CHECK! DON'T GUESS



INSPECTION TOOLS made of MEEHANITE METAL — designed to fill your various Inspection and Checking needs. Sturdily constructed to give you reliable, accurate service. SEND FOR DESCRIPTIVE LITERATURE

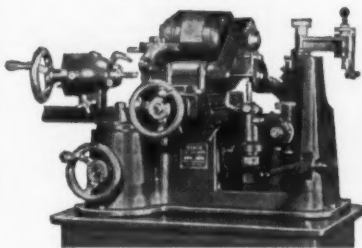
ACME TOOL CORP.

73 W. Broadway • New York 7, N. Y.

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HYBCO TAP GRINDER

Sharpens Chamfers, Flutes
and Spiral Points



MODEL 1100

- Capacities No. 0 Machine Screw to 1½" Hand Taps.

HENRY P. BOGGIS & CO.

708 E. 163rd St., Cleveland 10, Ohio

For more data circle 550 on Postpaid Card

November, 1958

They're tough, they're versatile
... and amazingly
low in cost!



ACE

STUB DRILLS

The short, heavy duty flutes of Ace Stub Drills are ground into top quality pre-hardened high speed steel to give you keener cutting lips, extra strength, longer drill life. Ideal for close-to-work screw machine operations and portable drilling. And they're now stocked in 140 standard sizes that cost approximately 20% less than equivalent jobber length drills!

Call your local Ace Drill Distributor today!



ACE DRILL

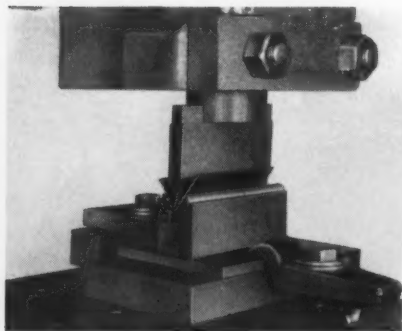
ADRIAN, MICHIGAN

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

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modern machine shop 243

new shop equipment . . .



O'Neil-Irwin Di-Acro Rol-Form Die

are available for punch press operations. Special lengths and sizes for

large radii bends will be furnished to specifications.

For more data circle 114 on Postpaid Card

★ modern machine shop ★

GANG PUNCHING MACHINE

Verson Allsteel Press Co., 9310 South Kenwood Ave., Chicago 19, Ill., has announced a gang punching machine which features light tonnage and large bed and ram area. It provides a capacity of 60 tons and 126 inches between housings. The ram is of single plate construction, while the bed is two plate construction with two slug chute openings in the rear. The machine has a press type square gibbing arrangement, adjustable in both directions. This assures perfect alignment for punching operations.

BAY "HANDICABINET"® BENCHES

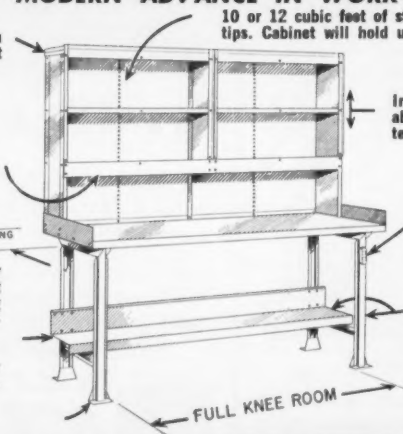
THE GREATEST MODERN ADVANCE IN WORK-BENCH DESIGN

Locking doors fold up on top of cabinet when not in use.

Cabinet recessed underneath for installation of "trough" type lighting.

1000 lb. capacity lower shelf with stop to prevent equipment from being pushed over back. Doubles as footrest.

Foot shims provided for permanent rigid adjustment to floor variation.



10 or 12 cubic feet of storage space at your fingertips. Cabinet will hold up to 1500 lb.

Intermediate shelves adjustable up or down on 1" centers. Extra shelves available.

Handi Electric Socket 2 prong or safety 3 prong type. Your cord will not become tangled with or blocked by work.

Electric wiring within supporting members. No drilling wiring installation, even in continuous run! Instructions provided.

Other Models and Styles available. Write for catalog and name of your nearest Bay Distributor.

1825 W. CAMBRIA ST., PHILADELPHIA 32, PA.

BAY PRODUCTS INC.

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CORRECT CLEARANCE
LONGER Punch & Die LIFE



One naturally follows the other.

Because of this, new die sizes are continually being added to our large, planned stocks so that dies with correct clearance for BOTH TYPE and THICKNESS of metal to be punched are immediately available.

New decimal die marking system makes selection of right die easy.

Send for catalog sheets listing complete stocks with charts and instructions for figuring clearance allowances.

T. H. LEWTHWAITE MACHINE CO.

317 EAST 47TH ST., NEW YORK 17, N. Y.

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Universal
**"FULL-FLO"
COOLANT NOZZLES
with AERATOR**

Ask for IPB-Sec. 2A Bulletin

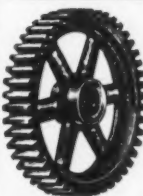


Quality . . . ALL METAL FLEXIBLE HOSE PRODUCTS

UNIVERSAL METAL HOSE CO.

2113 South Kedzie Avenue, Chicago 23, Illinois

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GEARS

**In Stock—Immediate
Delivery**

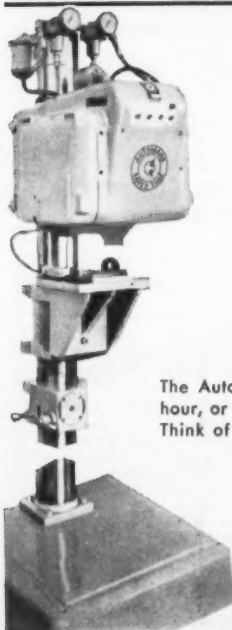
Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send in your blueprints and inquiries.

Send for Complete Catalog No. 20

CHICAGO GEAR WORKS

440-30 N. Oakley Blvd., Chicago 12, Ill.

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**MARK FLAT, ROUND OR
CONTOURED PARTS**

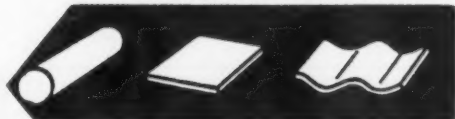
WITH

Automark

(MODEL HRMA)

ROLL MARKING MACHINE

MARKS ANY SHAPE



The Automark operates at speeds up to 6,000 or more 1-inch strokes per hour, or 1,400 strokes per hour on stroke of ram and die slide combination. Think of all the saving in time and money with Automarks in your shop!

CUTS PRODUCTION COSTS . . . GREATLY INCREASES OUTPUT

Here is speed, versatility and adaptability in a Marking Machine that operates by air pressure and controlled electrically. Marks any shape material . . . round, flat or contoured.

SEND FOR
BULLETIN

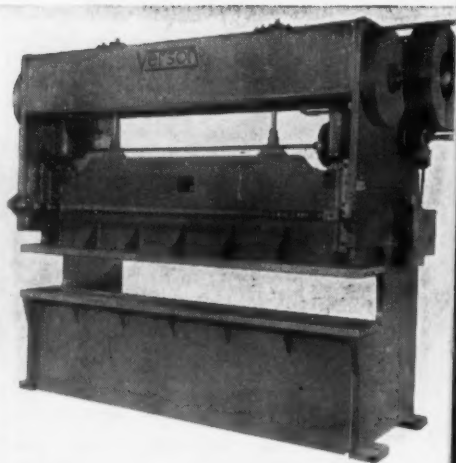
DEFIANCE MACHINE & TOOL CO.

1922 S. VANDEVENTER Dept. MM ST. LOUIS 10, MO.

For more data circle 556 on Postpaid Card

new shop equipment . . .

This new model is equipped with electric pushbutton clutch control, automatic lubricating system and air counterbalance of the ram. The stroke of the Verson Gang Punching Machine is 4 inches, with 4 inches of ram adjustment, which is power driven.

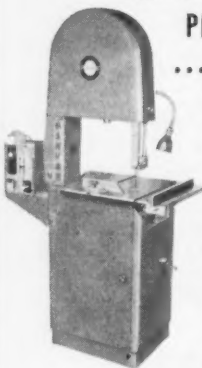


Verson Gang Puncher has 60 ton capacity

**The Universal Cutting Machine
PARKS M-2 18" Band Saw**

**Cuts METALS - ALLOYS
PLASTICS - WOOD**

**...and it costs
less than \$500!**



Here is a rugged, precision-built machine that will cut any materials you work . . . at the speed best suited for that material—from 50 to 4200 F.P.M. Dual-Range, fully variable gear drive. Priced to fit any shop budget. Write for literature on band saws, wood planers, and radial saws.

The PARKS Woodworking Machine Co.
1511 KNOWLTON ST., CINCINNATI 23, OHIO
Manufacturers of Quality Machines Since 1887

For more data circle 557 on Postpaid Card

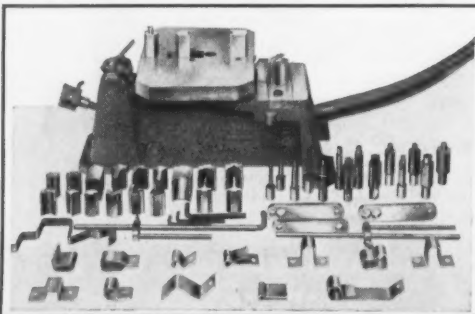
Shut height, bed to ram, is 14 inches and the area of the bed and ram, front to back and right to left, is 20 by 132 inches. The operating speed is 45 strokes per minute.

For more data circle 115 on Postpaid Card

★ modern machine shop ★

**GRINDING WHEELS FEATURE
MAN-MADE DIAMONDS**

An increase of grinding efficiency up to 35 percent is claimed for the



**Multiform
BENDER CUTTER**

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, and Steel Rule Dies for Metal Blanking.

**AIR OR HAND MODELS FOR UP TO
1/4" to 4" MATERIAL**

Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.

Dept. 6-M

Kalamazoo, Mich.

For more data circle 558 on Postpaid Card

Amcor Roller Stock Pushers



FOR POSITIVE STOCK ALIGNMENT

5 IMPORTANT ADVANTAGES

LOW COST — costs only a fraction of hand-made pushers
SIMPLICITY OF INSTALLATION — requires milling of one slot and drilling of one hole
COMPACT — engineered and manufactured for minimum space requirements
ANTI-FRICTION — hardened roller on brass shaft requires minimum effort to insert and feed stock
MINIMUM DIE MAINTENANCE — no refitting necessary when die is sharpened . . . increases pilot life

Write us for complete information

APPLIED MECHANICS CORPORATION

528 Fourth St., N.W., Grand Rapids, Mich.
 Telephone Glendale 9-8544

Distributor inquiries invited

For more data circle 559 on Postpaid Card

CARNES

CLEAN

machine tool sumps
 with equipment designed
 for the job

Drum Top Model
 DLO removes viscous
 oil, large chips,
 grindings, coolant.
 Single phase electrical
 operation. Self-sealing lid fits
 55 gal. drums. Suction to 27 1/2 in. water.



- Representatives in major cities
- Ask about trial demonstration
- Catalog shows full line



Drum Top Model
 AXO empties 30 to
 50 gal. oil, chips,
 sludge per minute
 from coolant tanks.
 Air operated pump
 eliminates service
 and maintenance. Automatic Controls. Low Cost.

COOLANT EQUIPMENT CORP.
 Verona 3, Wisconsin

For more data circle 560 on Postpaid Card

November, 1958

FREE REPRINTS

The following reprints are available free of charge in limited quantities upon letterhead request to this magazine:

- "Machine Tool Distributing and Engineering Services"
- "Grinding Jet Blades by Abrasive Belt Method"
- "Automatic Grinding Machine Assures Good Weld on Steel Drums"
- "Industrial Distributors—Their Vital Service to Industry"
- "Forming Aerodynamic Structures"
- "Modernize Your Shop and Save Money"
- "Packaged Precision Accelerates Servo-Valve Production"
- "Chill-Shunt Tooling in Tungsten Arc Welding"
- "Heat Treating—Should You Do It Yourself?"
- "Cold Point Drilling"
- "Fine Particle Wet Blasting and Metal Removal"
- "Converting a Grinder to Increase Production"
- "How to Guarantee Your Own Success"
- "Relief Grinding Twist Drills for Spottfacing"
- "Magnetic Chuck Facilitates Drilling Operations"
- "Unique Tooling Setup for Gun-Drilling"
- "Help—When You Need It"

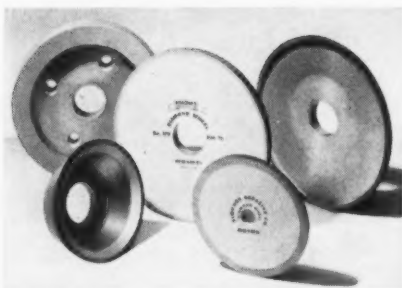
**modern
 machine
 shop**

431 Main St., Cincinnati 2, Ohio

modern machine shop 247

new shop equipment . . .

line of diamond grinding wheels, featuring the new man-made diamonds, recently introduced by Simonds Abrasive Co., Tacony and Fraley Sts., Philadelphia 37, Pa. The company is now manufacturing a complete line of all standard sizes and shapes, diamond depths, concentrations and grain and grade specifications of resinoid and vitrified bonded wheels made from



Above are Simonds Diamond Grinding Wheels

*How fast do you
want to drill...*

**10,000 RPM
MAYBE
15,000 OR
20,000 ?**



U. S. Drill Heads are designed to drill as fast as you need—and still maintain accuracy!

The rugged Fixed Center Head shown is a full ball bearing, oil-circulating model with built-in pump. It operates regularly in production at 15,000 rpm with very little heat! As in all U. S. Heads, shaved gears assure quiet, smooth operation—at all speeds. Write for catalog FC-57.

Adjustable and Fixed Center Multiple Drilling Heads.
Individual Lead Screw Multiple Tapping Heads.



UNITED STATES DRILL HEAD CO.

BURNS STREET • CINCINNATI 4, OHIO

For more data circle 561 on Postpaid Card



**Oil-circulating
head with
vertical
adjustment
spindles.**

man-made diamonds. Metal bonded wheels are furnished with natural diamonds, and resinoid and vitrified bonded wheels may also be supplied with natural diamonds, if desired.

**For more data circle
116 on Postpaid Card**

★ m m s ★

**AUTOMATIC
NAMEPLATE
MARKER**

For maximum efficiency in marking constant and changeable data on preformed nameplates, Jas. H. Matthews and Co., 3944 Forbes Ave., Pittsburgh 13, Pa., has developed the No. 222 Nameplate Marking Machine. Pneumatically operated and solenoid controlled, this unit utilizes a unique roll

WOODRUFF KEYSEAT CUTTERS



INTRODUCING STANDARDS & SPECIALS

1. Made from M-4 Long Life HSS.
2. Polished and ground flutes.
3. STEAM TREATED for longer life.

At slight extra charge—WIDTHS, undersize or oversize. Shanks, longer or shorter. Odd size shanks, 1/4, 3/8, 1/2, 5/8. Shanks held to length for quick replacement of cutters without relocating work piece. MATCHED DIAMETERS, Extra THIN CUTTERS.

SUPREME KEYSEAT CUTTERS CO.



1328 Forty-Third Street
Kenosha, Wisconsin
OL 4-8800

Dealers' Inquiries Invited

For more data circle 562 on Postpaid Card

New NOISELESS RIVET SPINNER Lowers Production Costs

Latest addition to HIGH SPEED HAMMER LINE. Model E capacity 1/8" diameter rivets; Model G capacity 5/16" diameter rivets. Pedestal and bench models for either foot or AIR. Air models eliminate operator fatigue.

FREE ASSEMBLY ENGINEERING SERVICE

Just send samples or blue prints of parts to be assembled. We'll recommend the right tools, procedure and equipment to use . . . without cost or obligation.

We have the most complete line of riveting machinery, so we can recommend the **correct type machine**, tooled and ready to go into operation.



HIGH SPEED HAMMER CO., INC.

315 Norton St., Rochester 21, N. Y.

HIGH SPEED Riveting Hammers • Stakers • Solenoid
Punches • Noiseless Rivet Spinners • Hand Presses •
Wire Strippers • Sensitive Drilling Machines • Die Filers

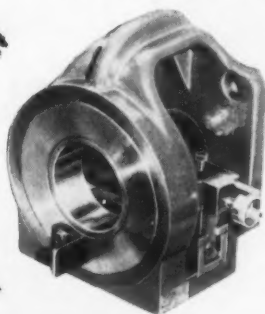
For more data circle 563 on Postpaid Card

TURN IRREGULAR SHAPES with the POLYGON TOOL BOX

GREENLEES

ACME GRIDLEYS

BROWN & SHARPS



CONOMATICS

NEW BRITAINS

ALL TURRET LATHES

With this Tool Box you can turn hexagonal, octagonal and other irregular contours from round stock, drilled and finished in one operation. Produce mating internal and external shaped parts. 48 Hour Delivery on Cams.

Price and complete details on request.

BRADLEY MACHINERY CO.

4400 CONNER

DETROIT 15, MICH.

For more data circle 564 on Postpaid Card

new shop equipment . . .

principle of indenting the marking. Interchangeable, tee head design marking type is contained in an inner chase which nests the nameplate. As the master chase is moved into the machine head, a micro-switch automatically actuates the pressure roll



Jas. H. Matthews No. 222 Nameplate Marker

LOWEST PRICES

Diamond Wheel Dressers

Guaranteed to be full, individual stones, mounted in 7/16 x 6" cold rolled shanks

Carat	Price
1/4—	\$ 2.25
1/2—	4.00
3/4—	6.00
1 —	8.25
1 1/2—	12.00
2 —	16.00



★ These diamonds can be set in any shank to your specification for \$1.00 each extra.

★ Prompt resetting service

Allstate Diamond Products, Inc.

Manufacturers of a complete line of diamond tools and wheels

245 W. 27th St., Dept. F, New York 1, N. Y.
Chickering 4-7725

★ Dealers' inquiries invited

For more data circle 566 on Postpaid Card

beneath the chase, quickly impressing the type into all blank panels of the plate in one stroke. Marking capacity is 500 to 700 plates per hour—each plate marked to uniform character depth, perfectly spaced and aligned for positive legibility and appearance. A large variety of type character sizes is available from 1/32 to 1/2 inch.

For more data circle 117 on Postpaid Card

★ modern machine shop ★

MULTIPLE SPINDLE DRILL HEAD

Any vertical single spindle drill press may now play a double role as



THIS VISE CAN PAY FOR ITSELF IN 30 DAYS OR LESS

"IMP" HOLD DOWN vise with the spring-loaded hold-down jaws automatically seat the work flat. You need no skill, in fact, you can do more jobs—do them better—with an "IMP" Hold Down vise. See your dealer or write us and we'll tell you how. New low prices \$129.50 to \$159.50.



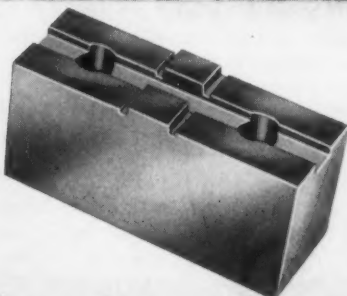
Send for the "IMP" Hold Down vise bulletin.

429 W. Superior St.
Chicago 10, Illinois

ILLINOIS METAL PRODUCTS

For more data circle 567 on Postpaid Card

SOFT BLANK



TOP JAWS AT 1/2 THE USUAL PRICE

Price per 3-jaw set	Med. Duty	Heavy Duty
For 6" Chuck - - -	\$ 8.15	\$ 9.00
For 8" Chuck - - -	8.80	10.50
For 10" Chuck - - -	10.50	12.00
For 12" Chuck - - -	12.00	14.25
For 15" Chuck - - -	14.25	16.25
For 18" Chuck - - -	16.25	17.50

Brand New Precision Jaws to Fit American Standard Chucks. Other Types at Similar Savings.

Write for Our Catalog

DU PAGE MACHINE CO.

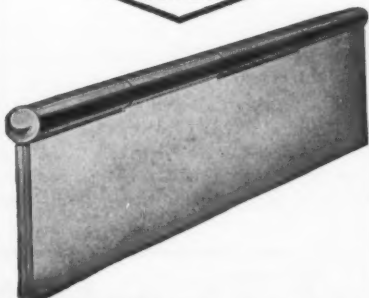
Box 204M

Elmhurst, Ill.

Distributorship Inquiries Invited

For more data circle 568 on Postpaid Card

AUTOM



CONTINUOUS HINGES

Manufactured by

**AUTO MOULDING
& MFG. CO.**

WRITE FOR CATALOG

1114 E. 87TH ST.

CHICAGO 19

For more data circle 565 on Postpaid Card

HYDRAULIC LIFT TABLES



Pat. Pending

Lexco portable adjustable height—hand or foot operated—saves you MONEY—TIME—ENERGY. For lifting and transporting heavy castings, dies, machine accessories and parts to machines and presses. Capacities to 2,000 lbs. Special sizes available—also AIR LIFTS and DIE HANDLERS.

Write for free bulletins.

**LEXCO ENGINEERING
& MFG. CORP.**
20 W. Chestnut St. • Souderton, Pa.

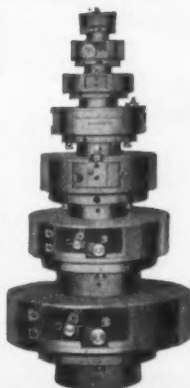
For more data circle 569 on Postpaid Card
November, 1958

MUMMERT-DIXON FACINGHEADS

Two-way tool feed
in 9, 12, 16, 20, 24,
30, 36, 40 and 46
sizes.

One-way tool feed
in 6, 9 and 12 sizes.
Automatic feed —
convenient tool ad-
justment — quick
feed reverse. Save
time and costly set-
ups.

Write for
folder.



MUMMERT-DIXON CO.
120 PHILADELPHIA ST. • HANOVER, PA.

For more data circle 570 on Postpaid Card
modern machine shop 251

new shop equipment . . .

a multi-spindle drill press and, thereby, better meet the demands for greater productivity.

A unit, known as the Arbo-3, is available from Jersey Manufacturing Co., 442 Livingston St., Elizabeth, N. J. This unit is an automatic revolving and indexing multi-spindle drill head

that will take from two to five tools at the same time.

All spindles are completely and quickly interchangeable. Eight independent speeds are available.

All of the work spindles are provided with suitable Morse and Jacobs tapers and, also, with suitable drilling and tapping chucks.

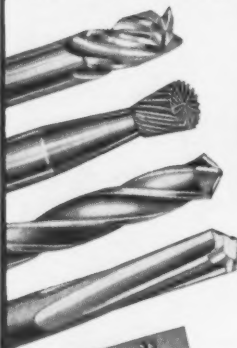
Features of this Arbo-3 Multiple Spindle Drill Head include the following: workpieces are completely ma-

chined with a single setup; changes speeds quickly; no reversing of the drill spindle is necessary during the tapping operation; automatic indexing is accomplished with motor, independently of the drill press motor; complete interchangeability of spindles. Drilling capacity is $\frac{1}{8}$ to 1 inch; tapping capacity is $\frac{1}{8}$ to 15/16 inch.

For more data circle 118 on Postpaid Card

"Raymac"

SOLID CARBIDE CUTTING TOOLS



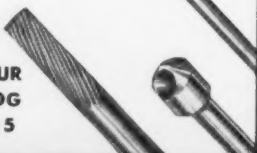
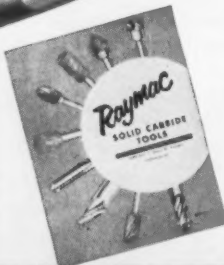
- MIDGET BURRS • ROTARY FILES
- DRILLS • REAMERS • END MILLS
- COUNTERSINKS • GRINDING TOOLS AND OTHER SPECIAL TOOLS

*Up to 25%
Longer Life*

Finest quality solid carbide ground and lapped to the sharpest cutting edges make "Raymac" tools the quality standard of the industry. More parts produced per tool and per regrind.

Make "Raymac"
your standard.

GET OUR
CATALOG
NO. 15

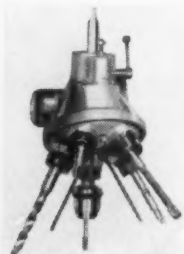


"Raymac"

15490 Dale

Division—DEXCO CORPORATION
Detroit 23, Michigan

For more data circle 571 on Postpaid Card



Arbo-3 Multiple
Spindle Drill Head
is shown above

ANOTHER PANNIER MASTER MARKER!



PANNIER'S STEEL LETTERS • FIGURES

- Longer lasting, less mushrooming.
- Better impressions—clear, clean.
- Letters, figures, or symbols.
- In sets, assorted, or singly.

Pannier Tested Steel Stamps provide you with clear, clean markings, maximum safety, longer life and highest quality.

Write for data. Wide variety of sizes available.

STANDARD MATERIALS

MARKING DEVICES
THE PANNIER CORPORATION

202 Sandusky Street • Pittsburgh 12, Pa.

Offices: Los Angeles • Chicago • Cleveland • Philadelphia • Birmingham

For more data circle 572 on Postpaid Card

ALL AMERICAN

FOR
PRECISION
FILING

An exclusive Ball and socket file clamp and file setting square assure true vertical filing position regardless of distortion in file shank. Hand finishing entirely eliminated.

ALSO SAWS AND HONES

Attachments permit accurate sawing and honing with infinite speeds from 170 to 470 strokes per minute. Table can be tilted 15° front and back.



Reasonably priced, the All American will quickly pay for itself in any tool and die shop. Write for catalog, price and name of nearest dealer.

ALL AMERICAN

TOOL & MFG. CO.
(Not Inc.)



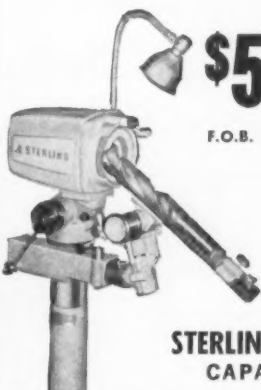
8043
N. LAWNDALE
AVENUE
SKOKIE, ILL.
(Chicago Suburb)

For more data circle 573 on Postpaid Card

November, 1958

True Conical Grinding on a STERLING Drill Grinder gives you Faster Cutting Drills and More Holes per grind

Conical grinding of a drill point produces the same clearance angle from O.D. to web. The drill enters the work easier, cuts a uniform chip that requires less pressure, less power.



\$550⁰⁰

F.O.B. Eau Claire, Wis.

STERLING "DV" CAPACITY

90°—140° Included angle with variable clearance angle set with built-in gage on all 2, 3 & 4 flute drills from 1/8" to 2 1/2" diameter.

Set-up is simple and fast because no chucks or collets are used. Built-in diamond wheel dresser produces a finished cutting edge that stands up longer. You get more, accurate holes with drills ground on a STERLING "DV".

Ask your STERLING Dealer for complete information on all STERLING Drill Grinders or write direct

McDONOUGH MANUFACTURING CO.

1521 GALLOWAY • EAU CLAIRE, WISC.
For more data circle 574 on Postpaid Card

modern machine shop 253

new shop equipment . . .

CONVEYOR APRON

Conveyor apron made with heavy wood slats mounted on large diameter roller chain, recently announced by Robert A. Main and Sons, Inc., 101 Pascack Rd., Paramus, N. J., is shown in the accompanying illustration. Heavy duty wood slats are riveted on



R. A. Main Conveyor Apron with wood slats

chain. Large diameter roller chain permits the conveyor apron to roll freely when upright or in inverted

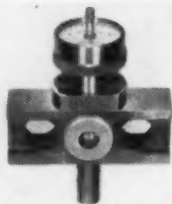
position. Heat treated rollers increase the life of the chain. Conveyor aprons can be made with wood, steel, aluminum or plastic slats in widths up to 14 feet and in any lengths.

For more data circle 119 on Postpaid Card

★ m m s ★

MICROMETER INDICATOR

Holmes Gage and Development Corp., Columbus 3, Ohio, recently introduced a micrometer indicator. By adding this indicator to any manufac-



Micrometer Indicator

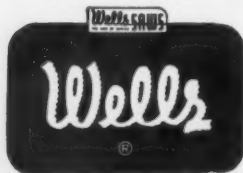
**Simple Design...
Rugged Construction**

No. 8 Model 600

**WELLS HORIZONTAL
METAL CUTTING BAND SAWS**

The simple design and rugged construction of every "Wellsaw" didn't just happen. We planned it that way! Over 30 years of specialized band saw experience and know-how is your assurance of the quality and service with each machine produced by Wells Manufacturing Corporation.

There is a Wells Saw of the right style, capacity and speed to do a better, more economical job for you. Wells Saws will deliver long, dependable service. Operating and maintenance costs are very low. See your Wells Distributor.

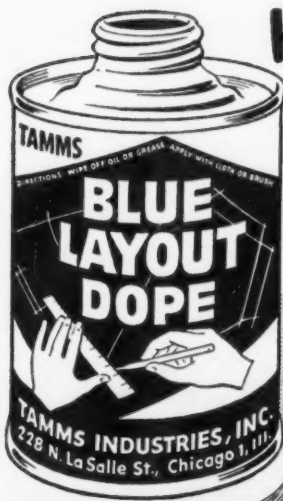


The Pioneers of Horizontal
**METAL CUTTING
BAND SAWS**
WELLS MANUFACTURING CORPORATION

808 Tyler Street

Three Rivers, Mich.

For more data circle 575 on Postpaid Card



Here's
the
dope!

WRITE
for
SAMPLE

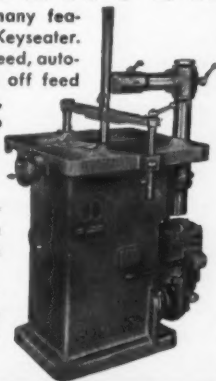
DRYS FAST-RESISTS OIL
WON'T CHIP, CRACK OR FLAKE OFF!

For more data circle 576 on Postpaid Card

MORRISON 1" AUTOMATIC KEYSEATER

Investigate the many features of this new Keyseater. It has automatic feed, automatic stop to cut off feed at given depth, automatic relief to back the work away from the cutter, automatic centering, automatic lubrication and no bushings required.

Write for more information on the finest Keyseater on the market.

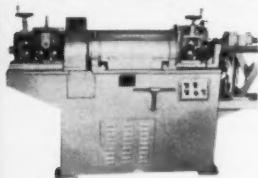


THE D. C. MORRISON CO.

P. O. BOX 10178 • CINCINNATI 1, OHIO

For more data circle 577 on Postpaid Card

If you use wire
up to 3/8" ...
**this new
SHUSTER
is for you!**

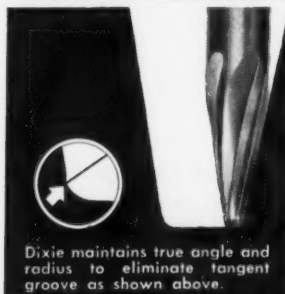


Send for complete details to

METTLER MACHINE TOOL, INC.

157 ADELIN ST., NEW HAVEN, CONN.

For more data circle 578 on Postpaid Card



Dixie maintains true angle and radius to eliminate tangent groove as shown above.

DIXIE ELIMINATES HAND FINISHING

Dixie Tool leads the way in the production of solid carbide precision cutting tools for die sinking and die making. Where precision and constant radii and angles are required, Dixie solid carbide ball end mills and die sinking cutters maintain their true angle and radius to help eliminate time consuming hand finishing.

Get 10 to 20 times longer tool life with Dixie's exclusive "Micro-Finish" process, and Super-sharp tools required for production of precision dies and molds in today's industry.



SEND FOR OUR
NEW CATALOG

DIXIE TOOL INDUSTRIES
4555 W. FRANKLIN AVE.
BRIDGEPORT, MICHIGAN

For more data circle 579 on Postpaid Card

new shop equipment . . .

turers' flush pin gages, the thousandths over or under normal can be read to salvage parts or reset machines (within plus or minus 0.012). The device can also be used independently for quality control. The indicator has 14 parts, one of which is movable. While it is easily adjusted in the toolroom for different requirements, operators

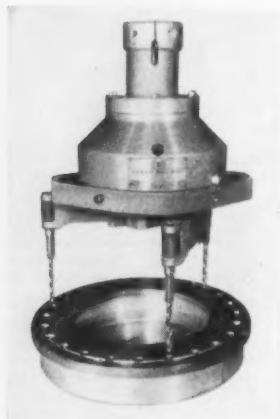
cannot tamper with the setting. The expense of setting masters and mounting brackets is eliminated.

For more data circle 120 on Postpaid Card

★ modern machine shop ★

SMALL SIZE DIE HANDLER

The Hansford Manufacturing Corp., 1239 University Ave., Rochester 7, N. Y., has introduced a small size die



Hole patterns can be changed
as easily as spindles.

NOW — from Zagar A MULTI-SPINDLE ADJUSTABLE HEAD

**For Drilling, Tapping and Reaming
with NEW ENGINEERING
CONCEPTS**

NO UNIVERSAL JOINTS.

NO BULKY GEAR CLUSTERS.

NO FLEXIBLE SHAFTS.

This "ready-to-use" head has whole new possibilities never before obtainable in one unit. It can be used on any standard drill press for any machinable material. Spindle arms can be removed and replaced easily, quickly. Drill practically any pattern within bolt circle as great as 23" dia.

Investment?—moderate. Results?—astounding. Get more details from Zagar representatives, and—

Write for Data Sheets S-1193

Zagar

ZAGAR, INCORPORATED

23898 LAKELAND BLVD.
CLEVELAND 23, OHIO

TOOLS FOR INDUSTRY and SPECIAL MACHINERY

For more data circle 580 on Postpaid Card

SAVE AIR COSTS & MAINTENANCE

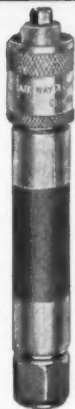


Model A

with Air-O-Check, the Leak-Proof Air Gun. Hundreds of thousands in use in factories, machine shops and foundries . . . wherever air is blown.

Expert design of internal fulcrumed lever insures leakproof, dependable, care-free service.

Write today for literature and prices.

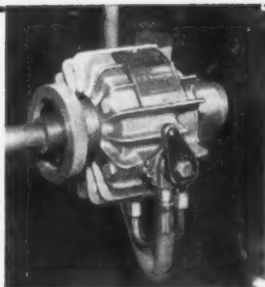


Model TA

AIR-WAY PUMP & EQUIPMENT CO.
1046 N. Kilbourn Ave., Chicago 31, Ill.

For more data circle 581 on Postpaid Card

WILSON AIR COLLET CLOSER



STEP UP PRODUCTION 20% +

. . . for most lathes to 1" bar stock capacity

- Hold delicate parts without damage or adjustment
- Iron grip for heavy work
- No adjusting for stock or part variations
- Finger-tip or foot control eliminates operator fatigue
- Eliminates jarring of head stock

(Ten day FREE TRIAL to reliable firms)

WILSON AIR COLLET CLOSER, INC.
909 40th Ave. NE, Minneapolis 21, Minn.

For more data circle 582 on Postpaid Card

ONCE SET, TOOL REPEATS WITHIN .0001"

. the **BONI** precision lathe, quick change, tool holder
Greater Profits . . . Better Accuracy

RAPID—Tool point adjustment done with screw; no time-consuming shiming.

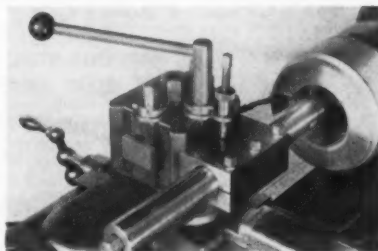
RIGID—Roughest cuts and precision finish cuts; stronger boring bars can be used.

VERSATILE—For large production as well as individual operations.

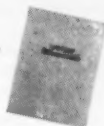
ECONOMICAL—Tremendous time savings on set up and tool changes.

SUPERIOR—Outperforms any other tool holder. Five sizes available for center heights from 4" to 18" and over. For lathes up to 35 H.P.

MOST CONVENIENT—Tools *always ready* in their holders; unlimited tool changes.



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Additional Manufacturers Agents Wanted

**NEISE
MODERN TOOLS**

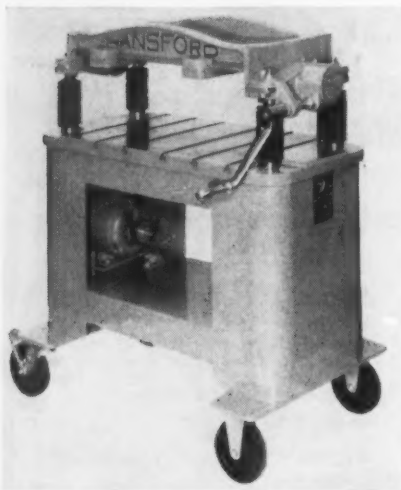
KARL A. NEISE Dept. MM-118, 404 4th Ave.
New York 16, N. Y.

For more data circle 583 on Postpaid Card

November, 1958

modern machine shop 257

new shop equipment . . .



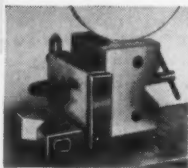
Hansford Model 1018 Small Size Die Handler

**LASSY MASTER
V-BLOCK
ANGLE PLATES**



Also ideal as a master for regrinding worn or inaccurate angleplates.

HARDENED STEEL
New design saves hours of setup time. Assures precise work accuracy to .0001.



Write for New illustrated catalog on
Time Saving Devices

LASSY TOOL CO.
PLAINVILLE, CONNECTICUT

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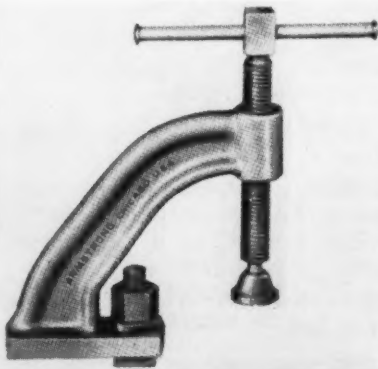
handler, known as the Model 1018. The following are features of this die handler: all cast construction, providing rigidity and accuracy; open top platen, giving access to the top of a die and any screws entering from the top; four lead screw construction with thrust bearings, which allows off center pull such as in separating two post dies or off center "tryout forces" up to 1,000 pounds; motorization of the vertical movement, providing time-saving rapid traverse; and common hand crank for electric switch, manually raising top platen and manually revolving top platen.

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TEE SLOT CLAMP

A tee slot clamp, available from Armstrong Brothers Tool Co., 5228 West Armstrong Ave., Chicago 46, Ill., has been designed for holding down work on planers, drill presses, milling machines and other machines having slotted tables. One or more clamps may be mounted in tee slot or slots by running the tee slot bolt, with which each clamp is equipped, into



Armstrong Brothers Tee Slot Clamp

November, 1958

the slot. The clamp is fixed in the desired position by tightening the nut and the work is held by tightening down screw.

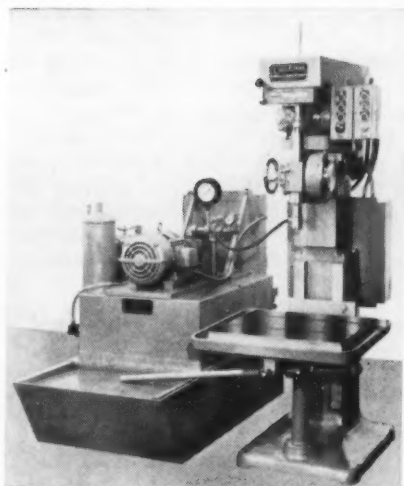
The clamp bodies are drop forged from a selected grade of steel, are heat treated to insure the maximum degree of strength and finished in gray baked on enamel. The heavy duty, heat treated screw is equipped with a sliding pin handle and the point is fitted with a vee slotted swivel cap to facilitate holding small rounds, in addition to flat surfaces. Each clamp is furnished with one tee slot bolt, nut and washer.

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HIGH PRESSURE COOLANT SYSTEM FOR DRILLING

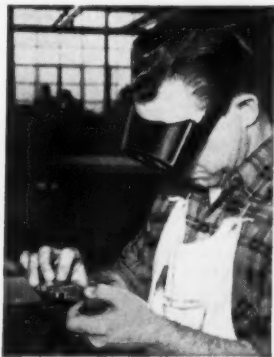
A high pressure coolant system, that can be used with carbide tipped



Edlund High Pressure Coolant System

gun drills, has been introduced by Edlund Machinery Co., 32 Huntington

People work better when they SEE BETTER® MAGNI-FOCUSER



AT CUTLER-HAMMER

a tool room worker uses the MAGNI-FOCUSER to read a Vernier Height Gauge

SPEEDS PRODUCTION With Third Dimensional (3-D) Vision Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. \$10.50.

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Edroy Products' Co.

Dept. P, 480 Lexington Ave.
New York 17, N. Y.

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new shop equipment . . .

St., Cortland, N. Y. This system is known as the Model 2HPC and has a 140 gallon oil capacity and a choice of motors: the 5 h.p. motor delivers 10 g.p.m. and the 10 h.p. delivers 20 g.p.m. Pressures are adjustable to 1,000 p.s.i. The oil return from the drill used is collected in a settling

tank with a removable strainer. From the settling tank, the oil is pumped by separate low pressure pumps through two replaceable filters that filter as fine as 10 microns.

Oil temperature in this system is thermostatically regulated through an adjustable temperature control, ordinarily by a water cooling system, but refrigeration can be used, if required. Each oil reservoir tank has its own oil

level gage, and there is an alarm system which indicates a low supply of oil.

For more data circle 123 on Postpaid Card

★ m m s ★

HAND PRESS

A hand press, known as the HP, Jr., which features controlled, positive action, is being marketed by High Speed Hammer Co., Inc., 315 Norton St., Rochester 21, N. Y. The HP, Jr. was designed for fast, versatile opera-



HP, Jr. Hand Press

FOR
DEPENDABILITY,
ACCURACY,
PRICE,
USE

CORRECTLY
AND
SENSIBLY
PRICED

HIGHEST
QUALITY
MADE

TWIST
Precision
DRILLS

ALL TYPES,
SIZES FROM
.0059" to 2"

A DRILL
FOR EVERY
JOB

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PRECISION TWIST DRILL & MACHINE CO.

10 Woodstock St.—Crystal Lake, Ill.—Phone 2040; TWX, Crystal Lake 3127

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tion and it can be used for riveting, assembling, forming, stamping, crimping, piercing and for all light press operations.

Its stroke is $\frac{3}{4}$ inch; vertical opening is adjustable from 1 inch to $2\frac{1}{4}$ inches; horizontal gap is $1\frac{1}{2}$ inches; spindle hole for punch is $\frac{3}{8}$ inch in diameter; die space is $3\frac{3}{4}$ by 6 inches; handle leverage is 7 inches; bench space, including the handle, is $10\frac{1}{4}$ by 10 inches; overall height is $13\frac{1}{2}$ inches; and the net weight is 50 pounds.

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★ m m s ★

VERTICAL PROFILER

A new concept in tracer control for automatic 360 degree profiling was revealed with the announcement of the Magnespark Profiler, recently developed by the Pratt and Whitney Co., Inc., 25 Charter Oak Boulevard, West Hartford, Connecticut.

Incorporating spark gap sensing elements, the Magnespark Profiler operates from a sheet steel profile template to produce any two dimensional straight line or irregular contour shape with speeds up to 60 inches per minute.

A unique and attractive feature of the machine is that it can trace a preset constant surface speed, thus producing better surface finish, as well as assuring long cutting tool life.

The unusual accuracy of the Magnespark Machine is attributed to extreme tracer sensitivity, coupled with backlash free drives to the table and spindle slide. The two spark gap pickups in the tracing head are so sensi-



"It's so easy to use!"

SEMI-SKILLED WORKERS GAGE PRECISION HOLES WITH POSITIVE ACCURACY

USING

COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from $\frac{1}{8}$ " to 10" diameter.

Can be put into use without elaborate get-ready because no electronics, no air base, no training program:

1. Automatic 2-point gaging —
 - a. Self-centering and aligning.
 - b. Uniform gaging feel regardless of who uses it.
2. Reads actual hole size.
3. Fixed — not passing — reading.
4. Detects tapers and other irregularities.
5. Positive indication within .0001".

PLUS —

TREMENDOUS ECONOMY

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COMTOR COMPANY, 64 FARWELL ST., WALTHAM 54, MASS.

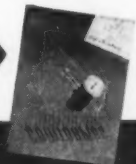
COMTORPLUG

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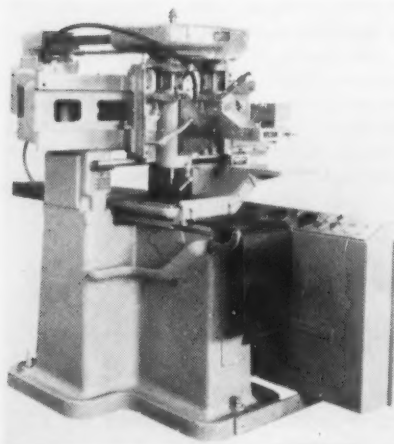


COMTORPLUG USERS INCLUDE

Airsearch Mfg. Co.	Hamilton Standard Division
Allison Div.	Harris Seybold Co.
Apex Electrical Mfg.	Homelite Corp.
Buick Motor Div.	Int. Harvester Co.
Century Electric Co.	Jacobs Mfg. Co.
Chicago Press Tool	Looming-Spencer Div.
Chrysler Corp.	McDonnell Aircraft
Continental Motors	National Lead
Curtiss-Wright	Northrup Aircraft
Detroit Transmission	Pentac Motor Div.
Douglas Aircraft	Scintilla Magneto
Fairchild Engine & Airplane Co.	Steel Products Eng.
Falk Corp.	Studebaker-Packard
Ford Motor Co.	Sylvania (Atomic Div.)
General Electric Co.	United Airlines
	Warner Gear Div.



new shop equipment . . .



Pratt and Whitney Magnespark Profiler

tive that it takes only 0.0002 inch stylus deflection to activate the table and slide. Simple tooling, as well as zero tracer pressure which permits use of soft steel templates without wear, also characterize this profiler. For more data circle 125 on Postpaid Card

★ modern machine shop ★

VERTICAL MILL HAS THREE DIRECTIONAL FEED

The Sundstrand Machine Tool Co., 2539 Eleventh St., Rockford, Ill., has announced the OM5 Vertical Rigidmil which has been designed for heavy cuts on large workpieces. This milling machine has longitudinal, transverse and vertical feed. It has a 50 h.p. vertical head mounted on a fixed column for maximum rigidity under heavy cuts. The saddle and table are also carried on a fixed base. This base design eliminates overhang deflection under maximum cutting positions and provides both maximum support under the cutter and a fixed table height.

LEIGH Pocket Tools

No. 787 Carbide and Steel Scriber \$2.50

Points reverse for personal safety. Approximately $\frac{1}{2}$ " x $\frac{3}{64}$ " dia., solid carbide rod brazed into steel (not just tipped) permits many regrindings.



No. 634 Combination Scriber and Permanent Magnet \$2.25

EXTRA POINTS



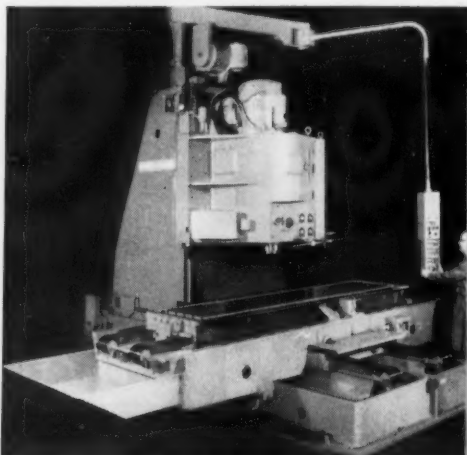
No. 676-D—Carbide straight \$.75
No. 676-A—Carbide 90° angle \$1.00
No. 787-D—High Speed straight \$.50
No. 787-A—High Speed 90° angle \$.60

New: No. 676-B "45° angle" Carbide Point, \$1.00 ea.
No. 787-B "45° angle" High Speed Steel Point \$.60 ea.

SPRING SPECIALTY CO.

27 N. FIFTH AVE. MAYWOOD, ILL.
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262 modern machine shop



Sundstrand OM5 Vertical Rigidmil

November, 1958

The 50 h.p. vertical spindle has a speed range of 14 to 1,540 r.p.m., with speeds selected from the control pendant. The head is capable of transmitting 1 h.p. per r.p.m. up to the maximum rated horsepower.

Vertical, transverse and longitudinal feed movements, feed rates and rapid traverse are all controlled from the pendant. Table movements can also be controlled from preset dogs for automatic cycles, if desired.

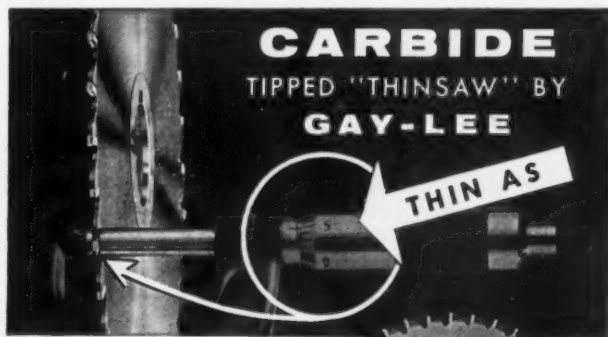
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★ m m s ★

DETAIL PRESS

Defiance Machine and Tool Co., 1920 South Vandeventer, Dept. MM, St. Louis 10, Mo., has announced a new and improved hand operated detail press for low production nameplate and small part stamping. This machine features automatic spacing and alignment of work. An easy turning character wheel character wheel locates each character quickly and easily with very accurate alignment. The operating lever will deliver up to 2 tons pressure on the work area, enabling the machine to mark in hard materials, such as

stainless steel. The marking depth and pressure may be preset and controlled by the operator to assure clearly defined and even characters. The rugged cast iron frame with precision bearing surfaces and the specially hardened and ground steel component parts guarantee long, trouble free service. The machine is lightweight and easily transported from one working area to another. It



Ideal for precision, high-production sawing, slotting, slotting! Exclusive Gay-Lee design features long-wearing carbide tips brazed into a circular seat which provides more brazing area, greater mechanical strength and maximum tip security. (Patented, U. S. Pat. No. 2675603, manufactured under license.)



- Thicknesses low as .030" ● Thickness tolerance can be held to .0001"
 - Wafer-thin for the most delicate work
 - Maintain positive alignment and rigidity
- Cut to full depth without runout ● Available in any carbide grade
 - O. D. from 1½" to 10"
 - Made to any tooth form

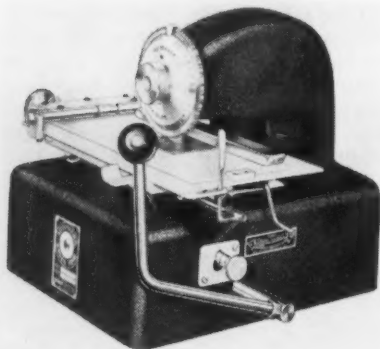
CARBIDE SAW SPECIALISTS



Write for free literature, or send us details of your problem.

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Automark Lever Actuated Typewriter

is available in hand operated and electric keyboard operated models. For more data circle 127 on Postpaid Card

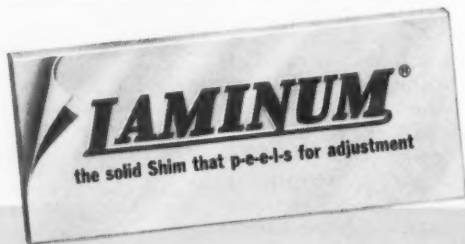


Spra-Kool Midget Spray Coolant System

SPRAY COOLING UNIT

Bar Products Co., 3703 Highcrest Rd., Rockford, Ill., has announced a new Spra-Kool Midget, which is a versatile, economical spray coolant sys-

Exclusive Feature!
NO TIME LOST WITH...



Laminated Shims of *Laminum* are so much more than "just shims." They're custom-made...to your own exacting requirements, including rigid Aircraft specifications...with laminations so completely bonded that they look and act like solid metal...yet simply p-e-e-l to a thousandth fit right at the job. No time lost! No machining! No grinding! No stacking! No counting! No miking! No dirt between layers—ever!

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"Engineering
Data File"

BRASS
with
laminations
.002"
.003"

**MILD
STEEL**
with
laminations
.002"
.003"

**STAINLESS
STEEL**
with
laminations
.002"
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ALUMINUM
with
laminations
.003"
only

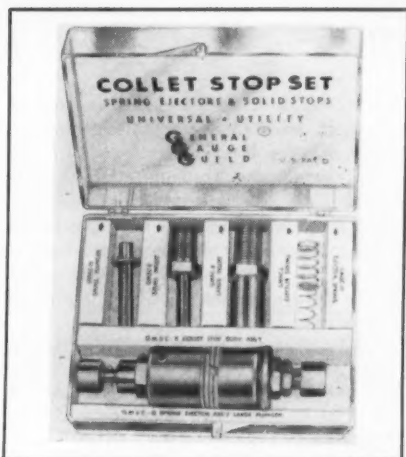
THE LAMINATED SHIM COMPANY, INC. Coast-to-coast Service in Aircraft

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tem with universal application. This unit eliminates the need for settling tanks, special containers and stands, filters, complex fittings and bulky tubing. It consists of a simple, adjustable ball check valve with standard 1/4 inch NPT male thread, small diameter extra flexible plastic tubing and a pencil size brass spray nozzle with a simple spring wire attaching clip. The entire unit weighs less than 3 ounces.

Simple connections and the flexibility of the small tubing makes the unit easy to set up and use for grinding, drilling, milling, sawing and a multitude of other machining operations. For more data circle 128 on Postpaid Card

★ modern machine shop ★



General Gauge Guild GM5C Collet Stop Set

COLLET STOP SET

General Gauge Guild, 7570 San Fernando Rd., Sun Valley, Calif.,

now has available its GM5C Collet Stop Set, which is universal in its application to lathes, second operation

Exclusive Feature! BETTER SERVICE ON...



Here's why...we've been specializing on both Laminated Shims and Stampings since 1913. Consequently we have our own special skills, tools and equipment—most of them unknown to competition—to produce Precision Stampings...standard or special...one or a million...faster, and at the lowest possible cost. Let us quote your next Stampings job...brazing, welding and assemblies, too!

Any one of these 3 METHODS

will economically produce Aircraft Quality Stampings—"one or a million"—to your detailed specifications:

1. MACHINE CUT METHOD. for just a few pieces—at experimental or pilot stage. No dies needed. Special techniques and equipment keep costs down.

2. SHORT RUN METHOD. Use of low cost, short run tooling, plus special equipment produces more than "just a few." Quality stays high—and costs stay low.

3. PRODUCTION RUN METHOD. Here is where our special tooling applies to great advantage. When dies are needed, charges are moderate. Fast delivery at lowest possible cost.

Send for free booklet—"Service in Stampings"

Quality Shims and Stampings • 3311 UNION STREET, GLENBROOK, CONN.

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new shop equipment . . .

machines, air collet fixtures, speed collet chucks, indexing fixtures and many other adaptations.

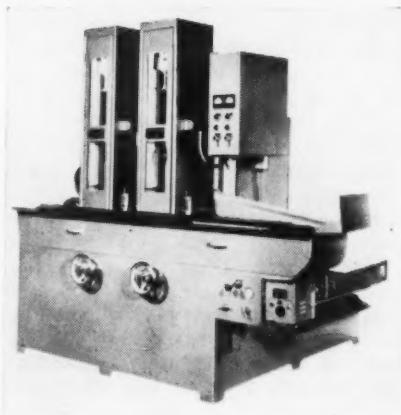
All standard 1 inch capacity collets can be used in the regular manner, as solid stop collets or as spring ejector collets. Automatic ejection speeds production and reduces piece part costs. Quick setup is provided for short or long runs.

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MULTIPLE HEAD ABRASIVE BELT PRECISION GRINDER

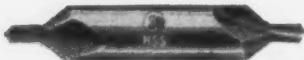
Engelberg, Inc., 106 Seneca St., Syracuse, N. Y., has announced a precision abrasive belt grinder, the Model No. 696, which permits two or more high speed grinding and finish-



Engelberg Precision Abrasive Belt Grinder

ing operations in the same time as formerly required for a single operation. Unmachined surfaces, ground on a series of progressively finer grit

Combined Center Drills and Countersinks—60°



No.	Diameter		Length		Price Each
	Drill	Body	Drill	Overall	
00	0.020"	1/8"	1/8"	1 1/4"	\$1.35
01	0.025"	1/8"	1/8"	1 1/4"	1.10
0	1/32"	1/8"	1/8"	1 1/4"	.95
1	3/64"	1/8"	1/8"	1 1/4"	.80

Super HSS. Top quality. Delivered from stock. No. 2 and 3 also available.

Micro Drills

from 0.002" - 0.040". Spiral and Flat in highest precision. Ground from the solid and hardened rod. Made from Super HSS. Supply from stock.

H. KAPP, Engineers

110-07 66th Rd. • Forest Hills, L. I., N. Y.

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266 modern machine shop

SAVAGE NIBBLING MACHINES

Patented Tool Holder Assembly →

NIBBLE your COSTS

- No sparks
- No open flame
- No oxidation
- No second operations

No. 236

Totally enclosed head . . . for safety.
Direct-over-center positive drive . . . gives more power.
One-piece 360° revolving head . . . for fewer parts and longer life.

Write for folder

W. J. SAVAGE CO.
KNOXVILLE TENNESSEE

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November, 1958

abrasive belts, can be finished to a fine polish to exacting tolerances in one continuous pass. For parts requiring rapid but exceptionally heavy stock removal, identical belts can be used on this conveyor type grinder to multiply production rates.

This model, available with from two to six or more individually adjustable grinding heads, offers an extensive capacity range, handling parts up to 5½ inch maximum width and 6½ inch minimum thickness. The machine's conveyor belt, which carries parts under the grinding heads, is powered by a ½ h.p. variable speed motor and is infinitely adjustable for feed rates from zero to 67 feet per minute.

For more data circle 130 on Postpaid Card

★ m m s ★

MAGNETIC VISE JAW LINERS

A vise jaw liner for protecting clamped work has been introduced by Severance Tool Industries, Inc., 724 Iowa St., Saginaw, Mich. With the Severance Magnetic Liner a protective, manufactured cap is provided

that should always stay handy, as they will hold to any steel surface—other parts of the vise, on machine or metal work bench.

The caps have ductile copper faces to protect clamped work from scratches, gouges or other hard-vise-jaw damage. They are easy to apply, being held firmly in place by strong magnets and stay in place when opening and closing jaws. The magnetic

HERE'S THE ANSWER TO YOUR TOUGHEST CUTTING PROBLEM

model B
Metal Cutting
Band Saw
(Wet or Dry)

FEATURES

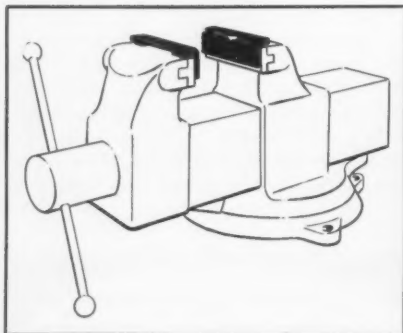
- Large Capacity
- Portability
- Light Weight
- 3-Point Suspension
- Operational Safety
- Centralized Controls
- Speed and Accuracy
- Lowest Cost

The Johnson Model B... the only light and semi-portable metal cutting band saw with wide-range heavy duty capacity. The versatile Model B is fast—accurate and economical, it easily handles 5' rounds and 10' flats with automatic precision. It's available in the standard Dry or Wet models to suit the need and can be caster equipped for plant portability. See for yourself, why Johnson Saws are preferred—everywhere! Write today for catalog and name of local dealer.

Johnson MANUFACTURING CORPORATION
1012 Barnes St. • Albion, Michigan

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Drawing shows Severance Vise Jaw Liner

feature eliminates bending, riveting, clamping, set screws or other means of getting makeshift liners to stay on jaws.

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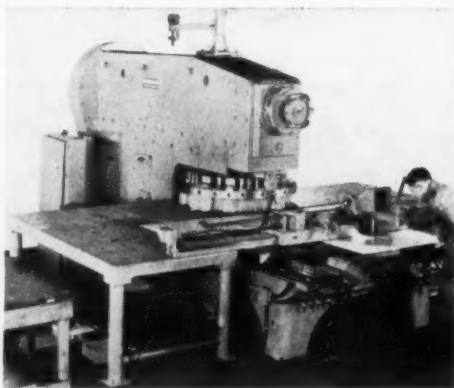
- Ground Cut Rotary Files for Soft Metals.
- Hand Chisel Cut for Hard Metals.
- Carbide Rotary Files.
- Salvage and Regrinding Service.
- Dealers Inquiries Invited.

Rota

FILE CORP.

1974—66TH ST.
BROOKLYN, N.Y.

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Wiedemann 80 Ton RA-101 Turret Punch Press

**TURRET PUNCH PRESS
WORKS FROM NON-
DIMENSION DRAWINGS**

Using an optical positioning system, holes are accurately and rapidly located to a non-dimensional full size drawing, and parts are efficiently pierced with the 80 ton RA-101 Turret Punch Press, available from Wiedemann Machine Co., 775 Gulph Rd., King of Prussia, Pennsylvania.

This turret punch press further reduces preparation time required to fabricate panels and other parts measuring up to 48 by 60 inches in a single press handling, or 48 by 120 inches in two handlings. Engineering



SAVE 50% on THROWAWAY INSERTS

- Sliced from on-end inserts of Carboloy, Kennametal, Wesson and other top quality carbides.
- Precision ground on all surfaces. Packaged in plastic.

Advise quantity, grade, style no. required. Write for free stock list and prices.

THE SHWAYDER COMPANY

Dept. M-118, 684 E. Woodbridge, Detroit 26, Mich.

Phone WO 1-4946

For more data circle 596 on Postpaid Card

time is minimized, since detailed shop drawings are not required. Hole-to-hole and edge-to-hole dimensions are eliminated. Only the outside dimensions of the part are required. Parts can be produced as quickly as the easy-to-make drawings are released.

This method is especially valuable for manufacturers producing short run work with repetitive drilling plans, common to most parts, but seldom falling in the same or relative location on any two panels.

For more data circle 132 on Postpaid Card

★ m m s ★

SILENT STOCK TUBE

Silent stock tubes, available in seven sizes for the company's automatic and hand screw machines, have been announced by Brown and Sharpe Manufacturing Co., Providence 1, R. I. These tubes are said to eliminate objectional noise created by the rotation of stock.

Using a silent stock tube, the bar rotates in a helically wound, wear resistant steel liner that has no sharp edges to damage the stock. This

ability to handle stock of either round or irregular cross section without marring is an important advantage, and is especially so where the bar being used is an expensive extruded shape.

The liner in this stock tube is open at both ends and is surrounded with sound-absorbent packing within a steel outer tube. This construction is claimed to deaden sound and to prevent the transfer of vibration. These Brown and

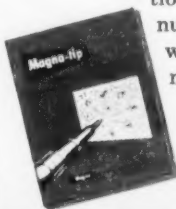
Quit Chasing Strays!



GO MAGNETIC **Magna-tip®**
with...

Magnetic Screw Driving Accessories

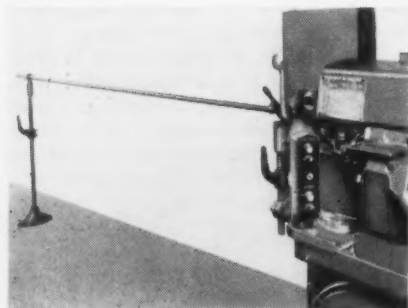
Dropping and fumbling... chasing stray screws, nuts and bolts... are bound to slow assembly operations when you use old-fashioned driving methods. Magna (Permanently Magnetic) bit holders, finders and sockets fit all power screw drivers. They help push production up and costs down by holding screws, nuts and bolts securely for smooth, speedy work. Ask your power screwdriver salesman for details.



WRITE for manual on the complete line of Magna-tip bit holders, finders, sockets and hand screwdrivers. Dept. 92G3, Magna Driver Corp., 779 Washington St., Buffalo 3, N. Y.

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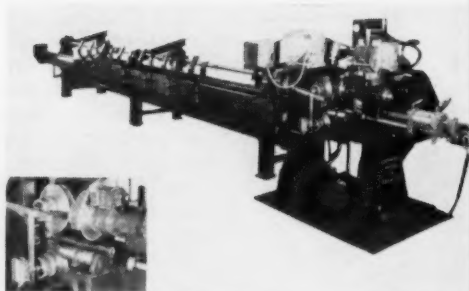
new shop equipment . . .



Brown and Sharpe Silent Stock Tube in use

Sharpe silent stock tubes will accommodate round, hexagonal, square or irregular shaped stock.

For more data circle 133 on Postpaid Card



Continental Rotary Pipe Cut-Off Machine

will automatically feed and cut the pipe to the predetermined length required by the user.

Simple adjustments can be quickly made for cutting pipes from $\frac{7}{8}$ to $3\frac{1}{2}$ inch o.d. The automatic feed section is also available in models to fit cut-off machines other than Continental.

For more data circle 134 on Postpaid Card

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CUT-OFF MACHINES

Completely automated rotary pipe and tube cut-off machines, with automatic feed, have been developed by Continental Machine Co., 2345 West Nelson St., Chicago 18, Illinois.

Two to four machines can be operated simultaneously with only one attendant. The operator simply loads the rack with from 15 to 25 lengths of pipe up to 21 feet long. The machine

HEAT TREATING FURNACE

Lucifer Furnaces, Inc., Neshaminy 6, Pa., has announced the development of two electric heat treating furnaces, the Series 5055 and 4055.

The Series 5055 is a heavy duty box type furnace for hardening, annealing, drawing and preheating operations. It is available in four models with heat ranges to 2,000 degrees F. The Series 4055 forced air furnace has been de-

NEW Box Table

**REPLACE YOUR BROKEN-OUT TABLES
AT A MINIMUM COST**

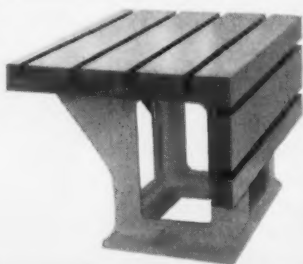
Size: 30" x 24" x 20". 500 Lbs. Side: 30" x 12", with $\frac{3}{4}$ " t-slots. Price: \$325.00, f.o.b. factory.

Write for descriptive bulletin

LAGOE OSWEGO CORPORATION

50 E. 12th St.

• OSWEGO, NEW YORK



For more data circle 598 on Postpaid Card

ACCURACY + VERSATILITY

the **DIXI 75** gives you horizontal optical jig boring

- Projected optical settings—direct reading to .00005" for linear motions and 1 sec. of arc for built-in rotary table. Linear optics are now provided with adjustable zero reference.

- 3" diameter boring spindle.

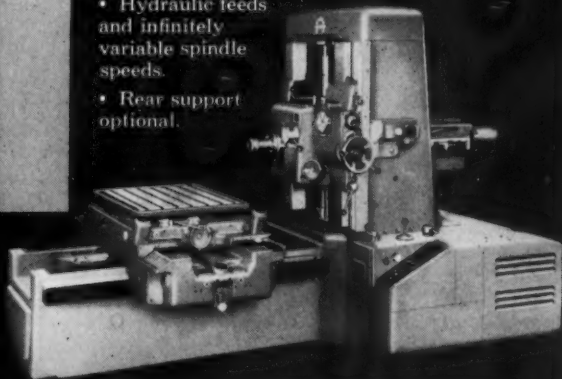
- Increased capacity: table size 39 $\frac{1}{2}$ " x 32"; 29 $\frac{1}{2}$ " cross travel; 23 $\frac{1}{2}$ " longitudinal travel; 25 $\frac{1}{2}$ " vertical travel.

PLUS...

- Automatic positioning device available.
- Simplified controls functionally arranged.

- Hydraulic feeds and infinitely variable spindle speeds.
- Rear support optional.

(Made in Switzerland
Measurement in inches)



MBI has engineers available for consultation, guarantees service by factory trained staff, and stocks spare parts in New York.

See the Dixi 75 at our Cleveland Demonstration Center
(Sloan Machine Co., 18714 Nottingham Road, Cleveland, Ohio)

M. B. I. EXPORT & IMPORT LTD.

A DIVISION OF MACHINERY BUILDERS, INC.

475 Grand Concourse, Bronx 51, N. Y.




"Over 25 years' experience in designing and building machinery."

For more data circle 599 on Postpaid Card

new shop equipment . . .

signed for tempering, drawing, heat treating aluminum and glass annealing. The 4055 is manufactured in nine standard models with operating temperatures to 1,250 degrees F. All Series 4055 furnaces feature controlled air circulation to insure temperature uniformity in the chamber.

For more data circle 135 on Postpaid Card



COLDPOINT DRILL

"The drill that hasn't been stopped yet"

If you have a drilling problem, we think we can solve it. We can sell you the drills or do your drilling on a contract basis.

MOSSBERG, INC.

7824 HAMILTON AVENUE
CINCINNATI 31, OHIO

For more data circle 600 on Postpaid Card

BORING BAR

by
MODERN



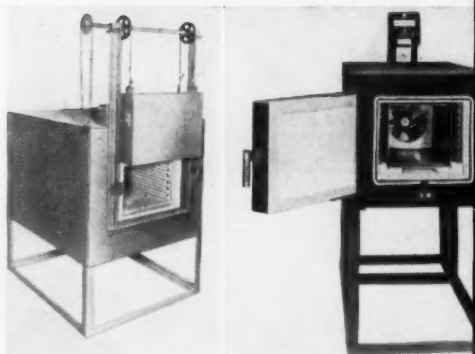
**KILLS
VIBRATION,
CHATTER!**

Scientifically designed to diminish vibration in boring, the MODERN boring bar has various size holes drilled from each end to minimize harmonic vibration. Hole diameters were determined by using a VIBRATION METER and probing bar every 1/4". The cavity is filled with shock absorbing material under vacuum, thus obtaining a dead bar of superior strength.

MODERN

MANUFACTURING CO., Inc.
680 Davisville Road, Willow Grove, Pa.

For more data circle 601 on Postpaid Card



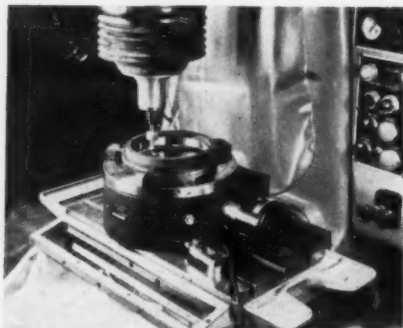
(Left) Lucifer Series 5055 Box Type Furnace;
(Right) Series 4055 Forced Air Furnace

FIXTURE FOR USE ON SURFACE OR JIG GRINDERS

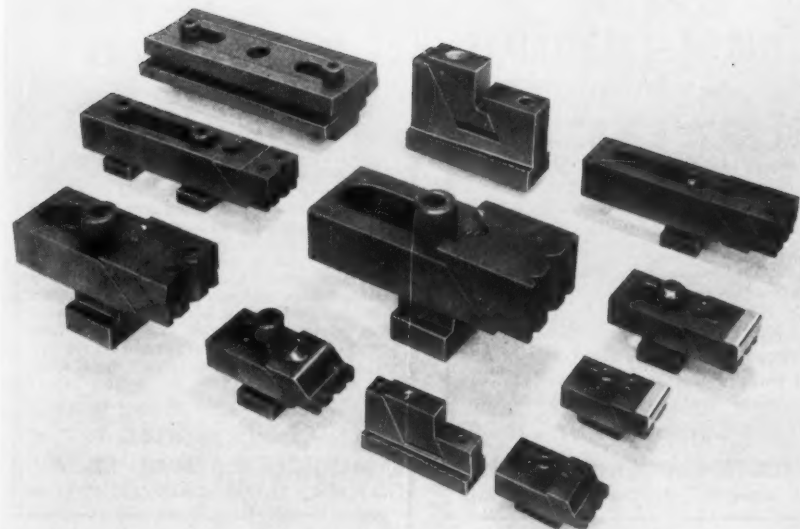
M-M Tool Manufacturing Co., Dayton 2, Ohio, has announced the availability of its Roto-Grind Precision Grinding Fixture, which can be used on surface or jig grinders.

Roto-Grind is a precision made rotary table which has been engineered to fit jig grinders, to hold grinding to unusual accuracy, to handle large or small diameters and to grind radii, dies and contours.

For more data circle 136 on Postpaid Card



Roto-Grind Precision Grinding Fixture



Where you can get...

DOWN-HOLDING DEVICES for any machine table or face plate

J & S All-Purpose Jaw Clamps eliminate U-Clamps, Straps and Fingers for lathes, planers, milling machines, boring millers, jig borers, etc.

Faster Set-up with any of the 5 Models of J & S Jaw Clamps—one adjusting screw has a holding force of $2\frac{1}{2}$ tons on the Small Model, to 12 tons on Jumbo Model for positioning and holding the work-piece.

Single powerful clamping action obtained from the 45° angle inward and downward movement of the jaw clamp is easily applied and controlled.

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See your industrial distributor or write today for free literature.



CLAMPCUT

J & S TOOL CO., INC.

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LIVINGSTON, NEW JERSEY

For more data circle 602 on Postpaid Card

November, 1958

modern machine shop 273

Simple and concise . . .

ESSENTIAL STRENGTH of MATERIALS

By FREDERICK R. LISARELLI, Purdue U.

This book emphasizes the *applied* and *practical* aspects of strength of materials rather than the abstract and theoretical. It will appeal especially to men now in industry who want to master the theory of strength of materials with the use of algebra and trigonometry alone. Examples are worked out in detail and are followed by problems with answers. Tables of properties of materials are included as they become necessary for the solution of problems. 261 pages, 5½x8, 163 illus., \$4.75.

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Book Editor

MODERN MACHINE SHOP

431 Main St. • Cincinnati 2, Ohio

*A one-volume guide to the
tools, materials, and processes
of modern manufacturing . . .*

MACHINE TOOLS for METAL CUTTING

By W. H. ARMSTRONG, Penn. State U.

The easy-to-use organizational plan of this book makes it valuable *on the job*, when you want facts in a hurry. Here is an A-to-Z description of every principal type of machine tool . . . and each section is followed by a summary in outline form which gives you at one quick glance the basic facts and data you need about some important piece of machine-shop equipment. The book uses direct-on-the-job talk and more than 200 clear photos and labeled drawings to help you do a better job in all phases of modern machine-shop manufacture! 347 pages, 6x9, 212 illustrations, \$5.00.

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*Your practical guide to selection
and design of bearings . . .*

BEARING DESIGN and APPLICATION

PROVIDES YOU WITH THE MEANS to *select* and *design* the proper type of bearing for an installation. The material covers rolling element bearings, slider bearings (both journal and thrust), lubricants, bearing materials, and trouble shooting. Not in the least theoretical, it contains explicit equations for design procedures and many illustrative examples. A comprehensive picture of *all* the factors entering bearing design and applications problems in almost all types of industrial equipment . . . plus trouble-shooting charts. By Donald F. Wilecock and E. Richard Booser, both of General Electric Co. 470 pages, 6 x 9, 225 illustrations, \$12.50.

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431 Main St. • Cincinnati 2, Ohio

*Helps you achieve sound design
and production economy . . .*

ASME HANDBOOK METALS ENGINEERING —PROCESSES

JUST PUBLISHED IN THIS HANDBOOK YOU will find detailed data on the various processes by which metals are converted into finished products. Composed of a wealth of practical, day-to-day engineering helps; covers such areas as: the heat treatment of steel, all forms of casting, hot and cold working, powder metallurgy, welding, machining, and electroforming. For each of the manufacturing methods gives a compilation of the basic physical characteristics to be considered, and general advantages and limitations usually encountered. Edited by Roger W. Bolt, Editor, *Automation*. 423 pages, 7 x 10, 512 illus., \$13.50.

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MODERN MACHINE SHOP

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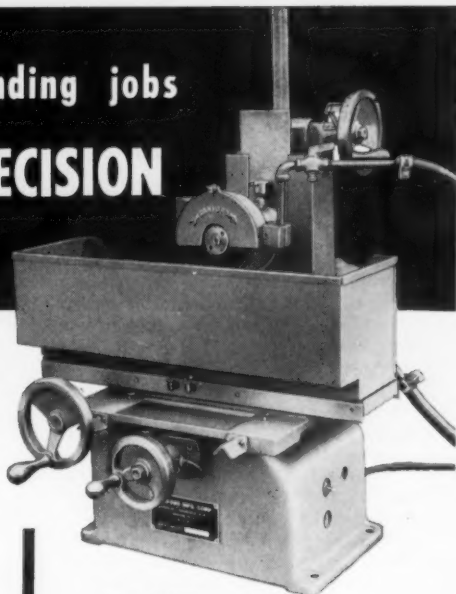
to do small grinding jobs
to **MICRO-PRECISION**
FAST...

**you need
the
SANFORD
Model SG
SURFACE GRINDER**

This unrivalled small parts grinder can be depended upon for micro accuracy. It's easy to use too . . . every hand wheel and operating switch is at your finger tips.

Designed and built by engineers and tool makers of rare foresight for tool, die and gage work, it has been constantly preferred after these many years of proven worth.

Write for fully illustrated literature, replacement parts and special attachments data with price list.



**For WET or DRY
grinding, specify
optional equipment.**

PARTIAL SPECIFICATIONS —

Chuck Surface—3" x 5" or 4" x 6".

Table travel—8", traverse 4".

Vertical head movement—6".

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with chuck—4".

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Spindle speed—approx. 5500 RPM.

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dynamically balanced.

Dimensions—23" x 30" x 27" high.

Net wt. approx. 160 lbs.

Representatives in major industrial areas

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1022 Commerce Ave., Union, N. J.

For more data circle 603 on Postpaid Card

November, 1958

modern machine shop 275



Advertising Competition Awards

Ten machine tool companies will receive awards in this year's Advertising Competition sponsored by the Advertising and Market Research Committee of the National Machine Tool Builders' Association, according to Herbert E. Carson, advertising manager of Niagara Machine & Tool Works, Buffalo, New York, who is general chairman of this committee of the Association.

The awards certificates will be presented to the winning companies at the Association's Annual Meeting at The Homestead, Hot Springs, Virginia, November 5-7. A total of 235 entries in the competition were received from 49 companies.

The judging was done in Chicago on October 7th. The judges were J. J. Dahm, Director & Senior Vice President, Sunbeam Corporation, Chicago; Ernest C. Beckman, Works Manager, Modern Metal Products Co., Rockford; Jeremy C. Beman, Vice President, Erwin Wasey, Ruthrauff & Ryan, Inc., Advertising, Chicago.

Entries were judged on the basis of

1. Appropriateness of entry to intended usage
2. Appeal—ability to attract reader and retain for complete reading
3. Aptness of art and illustrations
4. Readability—typography and copy

The six categories in the contest for which awards were made and the winning companies are as follows:

Category I—Trade paper single or double page advertisement, Black and white

First: National Automatic Tool Co., Inc., Richmond, Indiana

Honorable Mention: The Warner & Swasey Company, Cleveland, Ohio

Category II—Trade paper single or double page advertisement, Two colors

First: The Fosdick Machine Tool Co., Cincinnati, Ohio

Honorable Mention: DeVlieg Machine Company, Royal Oak, Michigan

Category III—Trade paper single or double page advertisement, Three or more colors

First: The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut

Honorable Mention: Buhr Machine Tool Company, Ann Arbor, Mich.

Category IV—Catalog or bulletin describing a single type machine

First: The Minster Machine Company, Minster, Ohio

Honorable Mention: Cincinnati Lathe and Tool Co., Cincinnati, Ohio

Category V—Catalog or bulletin describing a line of machines—General

First: The Lodge & Shipley Company, Cincinnati, Ohio

Honorable Mention: Clearing Machine Corporation, Division of U. S. Industries, Incorporated, Chicago, Illinois

Category VI—Best single direct mail piece

First: Clearing Machine Corporation, Division of U. S. Industries, Inc., Chicago, Illinois

Honorable Mention: The Lodge & Shipley Company, Cincinnati, Ohio

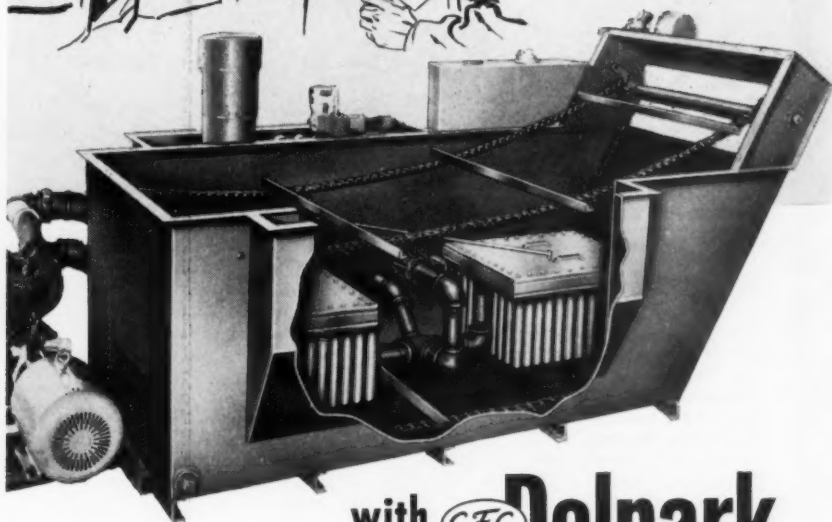
"The purpose of the competition of this year," Carson explained, "was to arouse greater interest throughout the machine tool industry in developing advertising techniques which would be more attractive as well as contain more information of the kind buyers of machine tools want."

This is the fifth advertising contest to be sponsored by the Association. Last year's contest covered direct mail pieces.





**KEEP
COSTS
DOWN...**



with **CFC** **Delpark**
FILTER-MATIC

It's actually *easier* to reduce downtime and increase tool life with CFC Delpark Filter-Matic . . . for constant vacuum filtration of coolants, cutting oils, rolling oils, solvents and other fluids. Filter-Matic offers a wide selection of elements and filter media to assure the *perfect combination* for your operation.

Use of Leaf-Type or Tubular Screen elements is determined by the fluid viscosity, dirt load and proper vacuum required for maxi-

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For the assistance of a Commercial Filters engineer, write to Department MM.

COMMERCIAL FILTERS CORPORATION

MELROSE 28, MASSACHUSETTS

PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

MICRO-CLARITY AT MINIMUM COST



with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.



Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic inductor conveyors.

For more data circle 604 on Postpaid Card

November, 1958

modern machine shop 277

where
to
get it

where to get it

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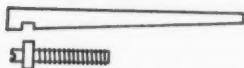
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Ajust-Tru® Power Chuck with Aluminum Body



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- ★ 40% Weight Saving
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For more data circle 605 on Postpaid Card

November, 1958

modern machine shop 279

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For more production and longer life from cutting tools, wearing gears and precision parts—master mechanics always use oilstone files.

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IN-4

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November, 1958

modern machine shop 281

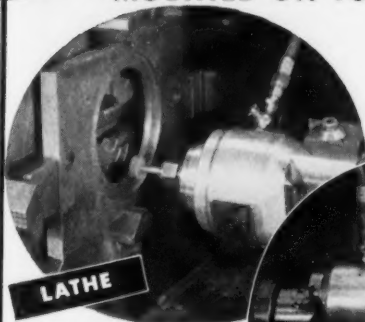
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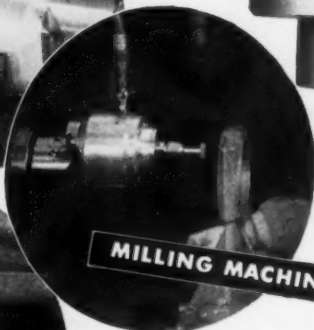
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Precision Hole Grinding Costs
USING AN

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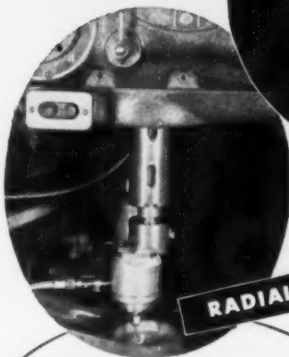
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LATHE



MILLING MACHINE



RADIAL DRILL

**OR MOUNT ON JIG BORER
TO CONVERT MACHINE
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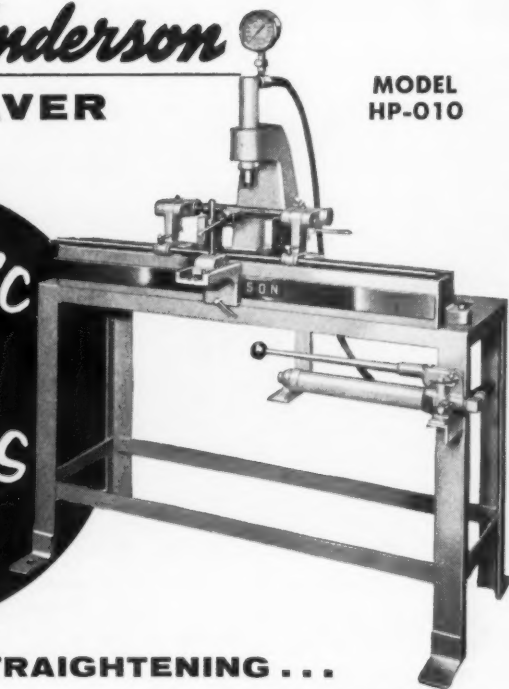
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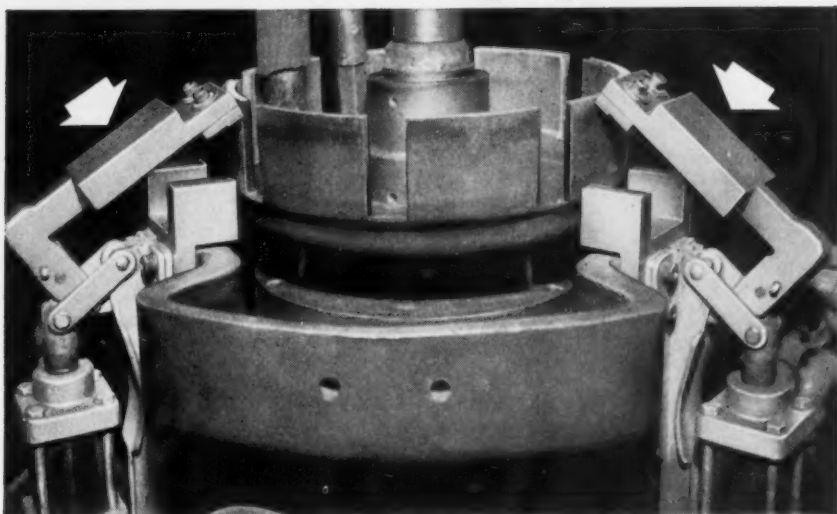
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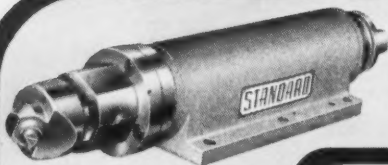
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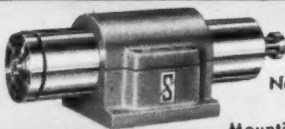
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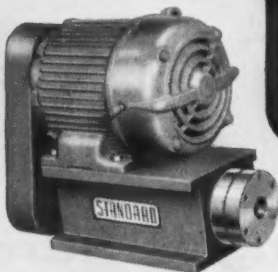
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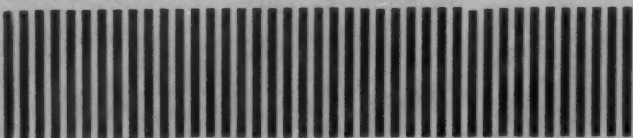
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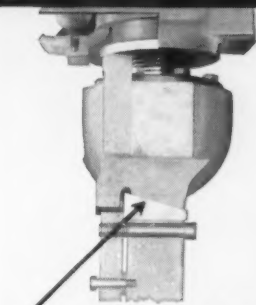
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- in minutes instead of hours
- without damage . . . die holder destroyed

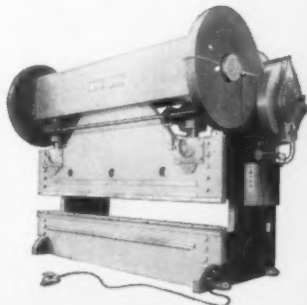
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With a Lodge & Shipley Press Brake, release of the stuck dies is a quick, simple, non-destructive matter as described in the accompanying detail.

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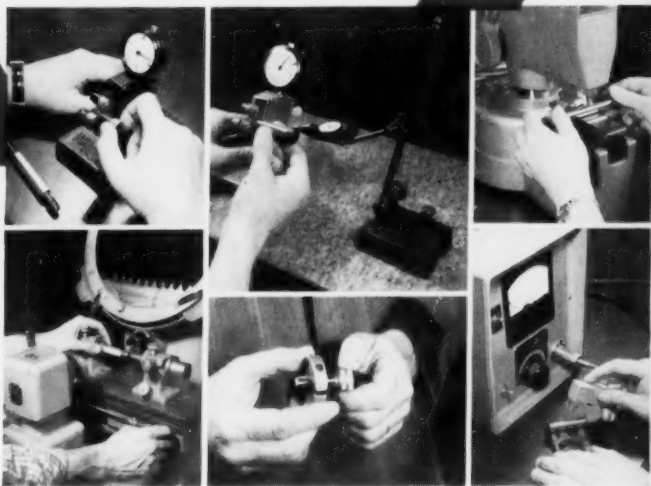
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